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AVIATION

The Oldest American Aeronautical Magazine

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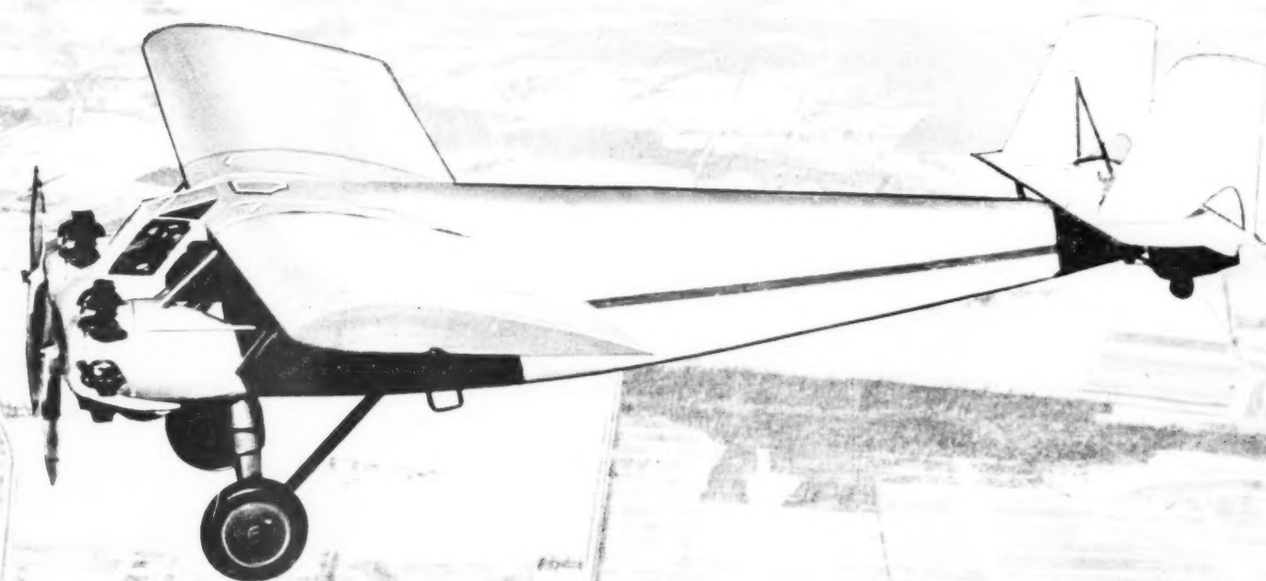
Racing Seaplanes...PRESENT AND FUTURE

THE AIRPORT ON A *Paying Basis*

Voice OR *Code* IN RADIO



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AVIATION

The Oldest American Aeronautical Magazine

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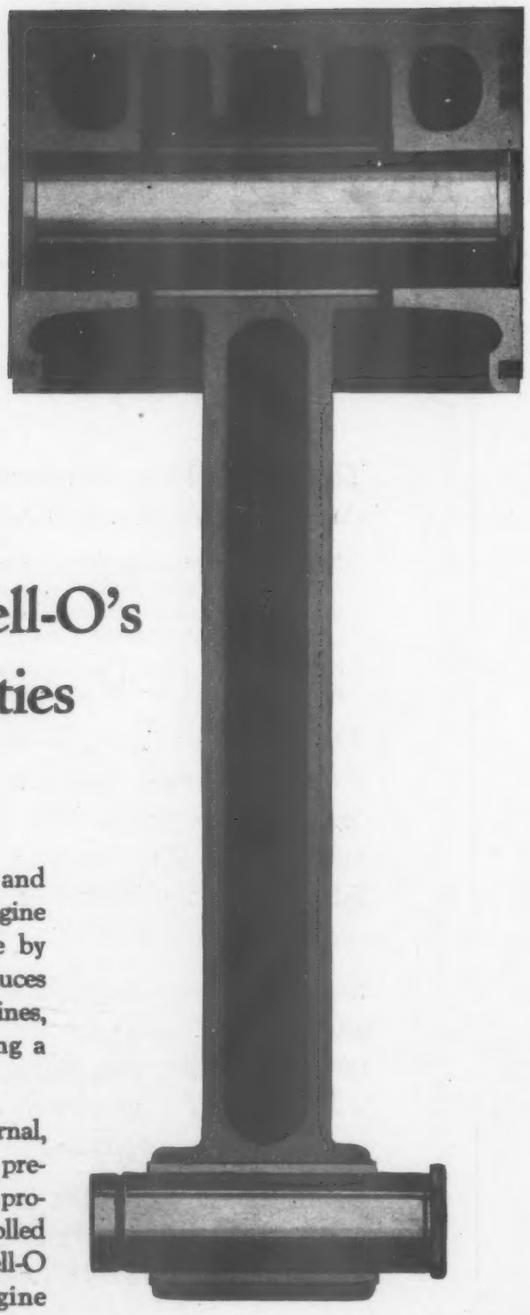

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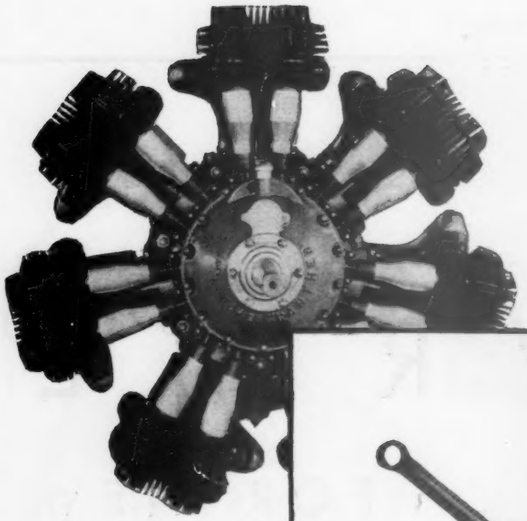
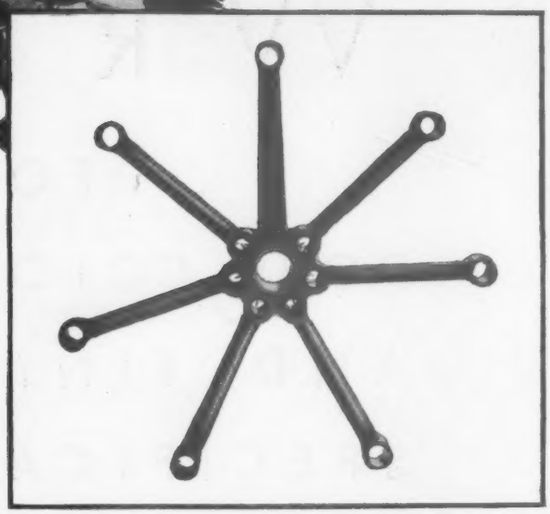


Dependable materials are the best assurance of dependable performance

Left: MacClatchie Panther, L-head radial airplane engine, mfd. by MacCLATCHIE MFG. CO., Compton, Calif.

Below: Nickel Chrome Steel connecting rod assembly used in the MacClatchie Panther.



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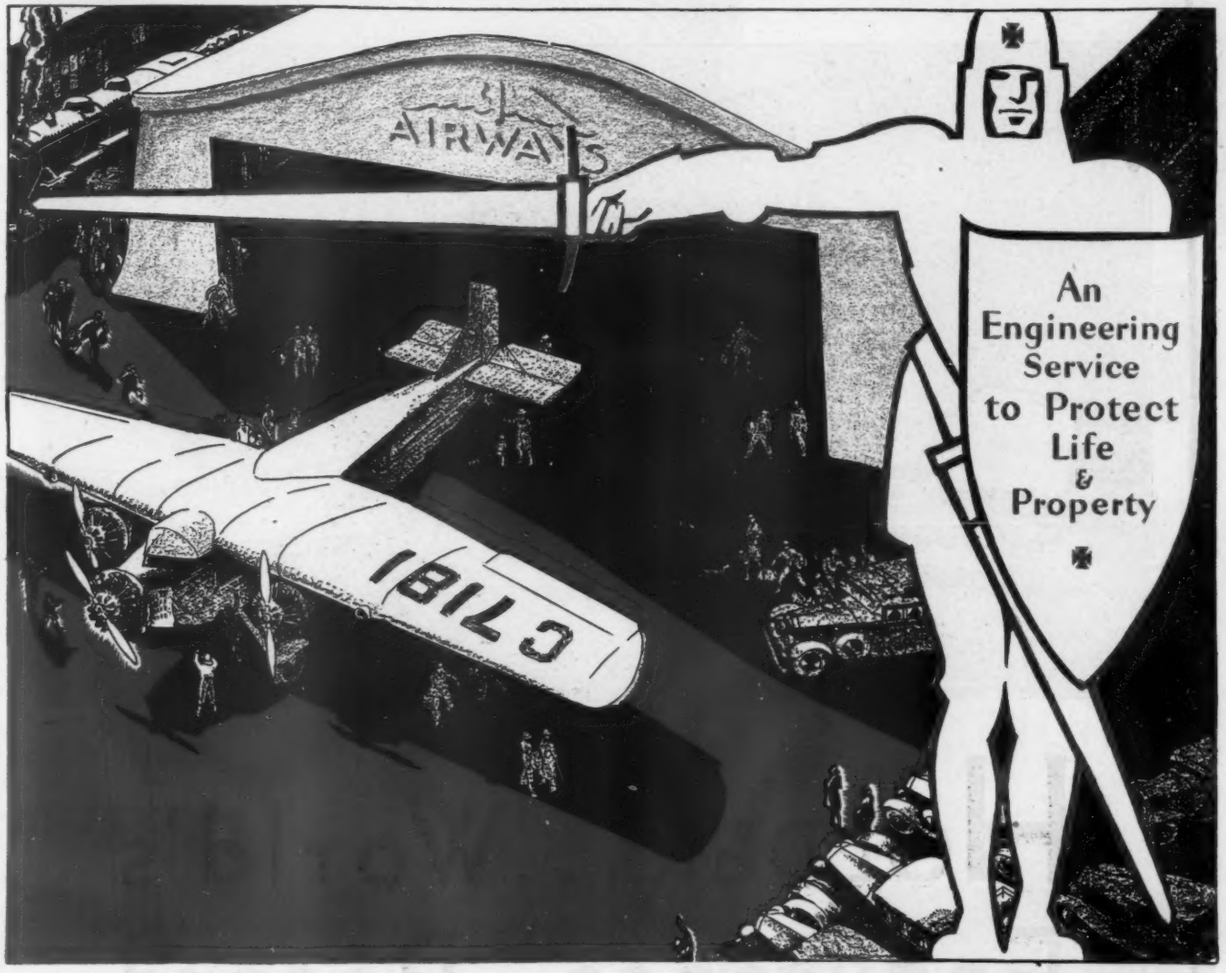

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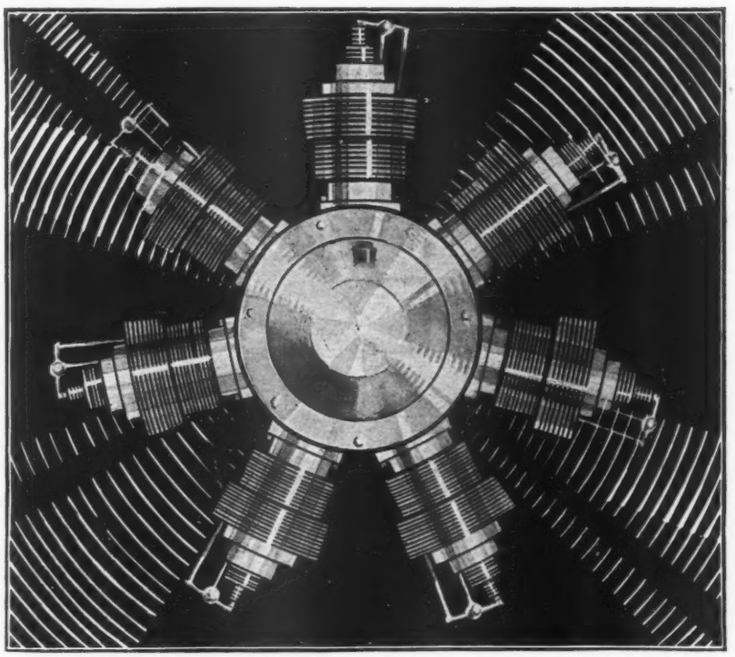

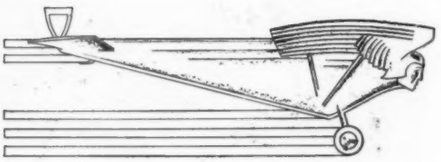

First of all, the AIRPLANE ENGINE must lift itself . . .

Next to reliability, the weight of an airplane engine is all-important. An airplane engine literally lifts itself by its boot straps—excess weight in the engine means less pay-load in the plane.

Get rid of surplus dead-weight by using the light, strong Alloys of Alcoa Aluminum. Weighing about ⅓ as much as iron or steel, some of these Alloys, when heat treated, attain the strength of structural steel—55,000 pounds per square inch *minimum*. These aluminum alloys are highly resistant to corrosion.

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Though less than one year old...
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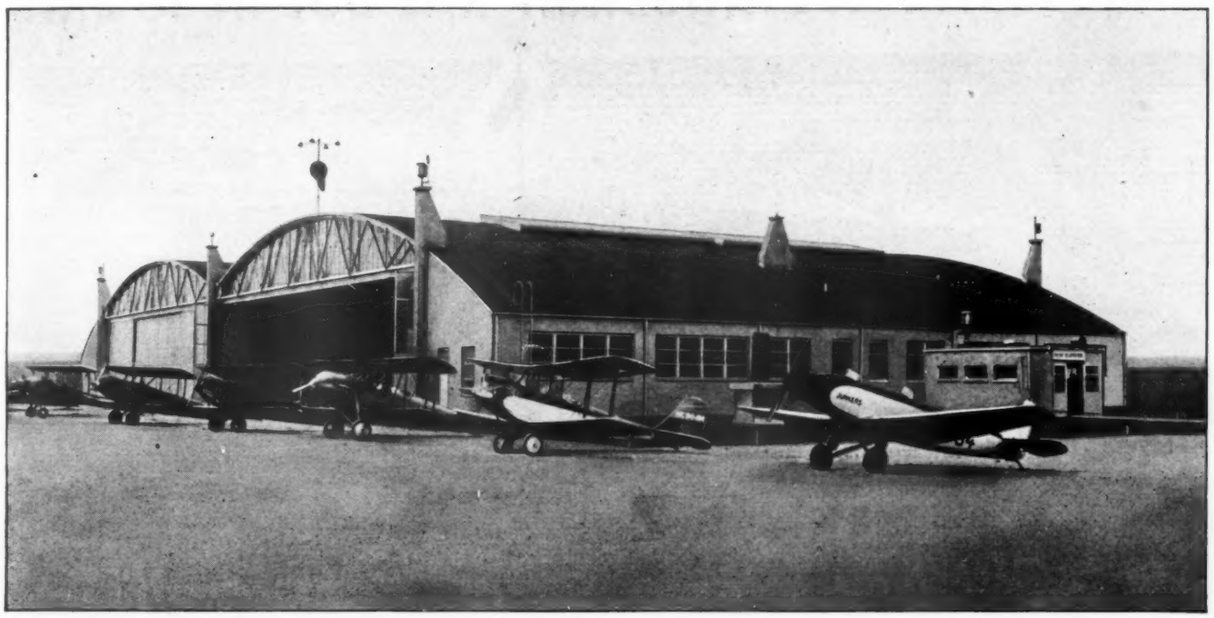

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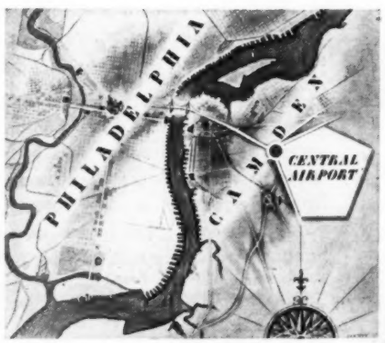

Five broad main highways converge at Central Airport and 100,000 motor cars have been counted here on a summer's day. Visibility as well as accessibility is assured!

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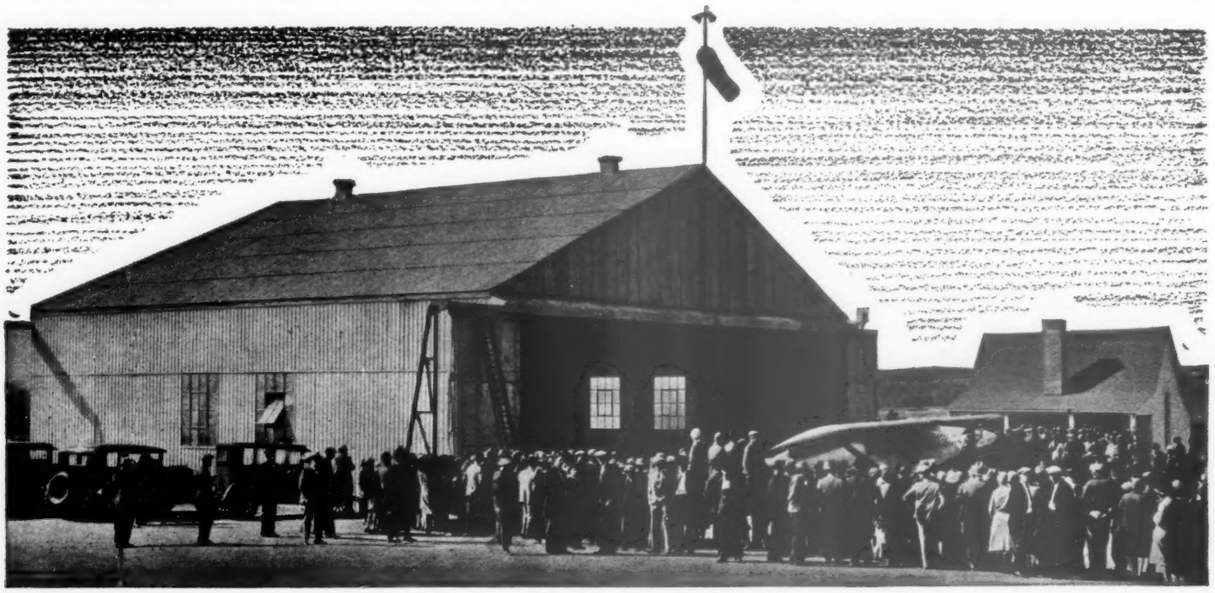

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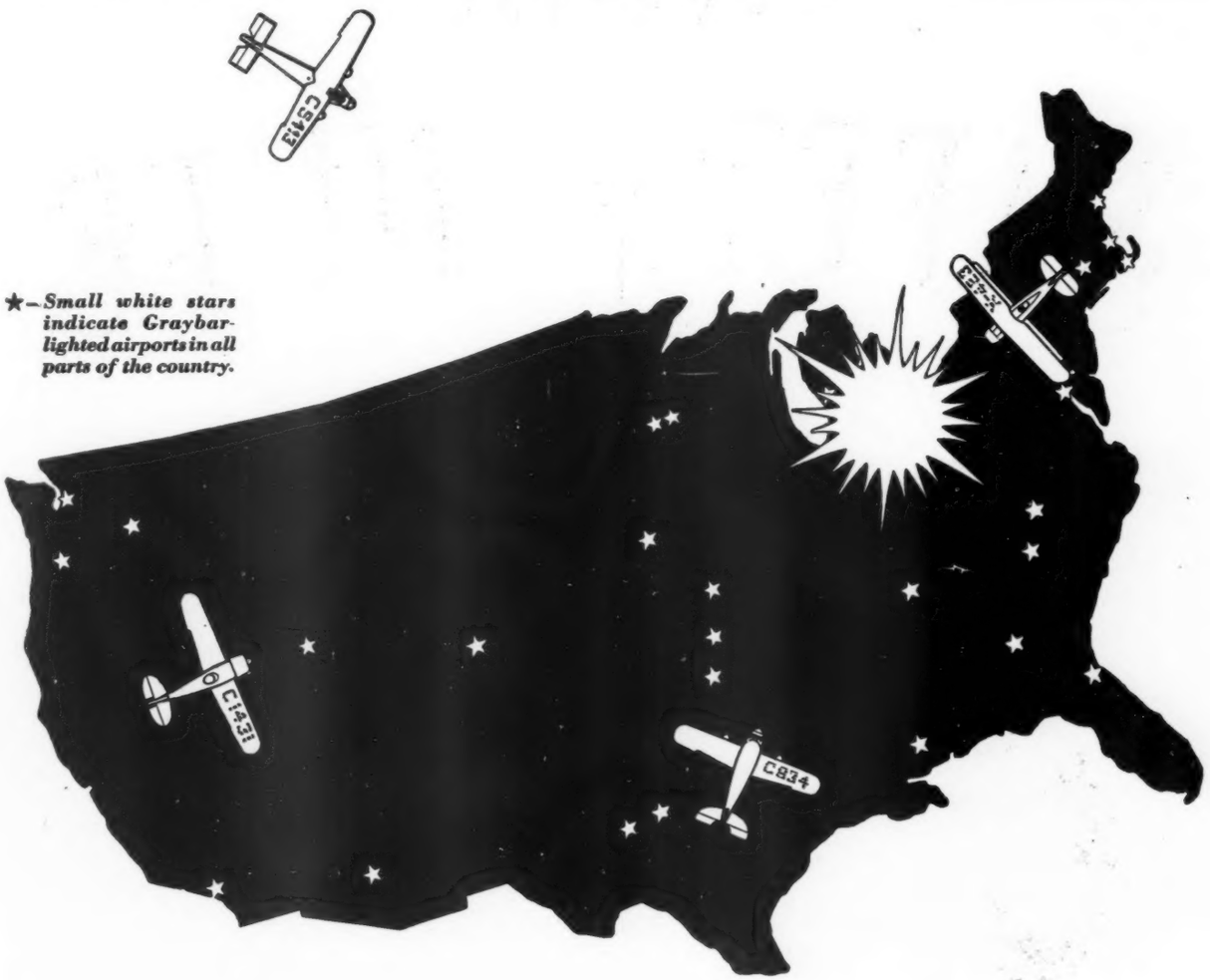

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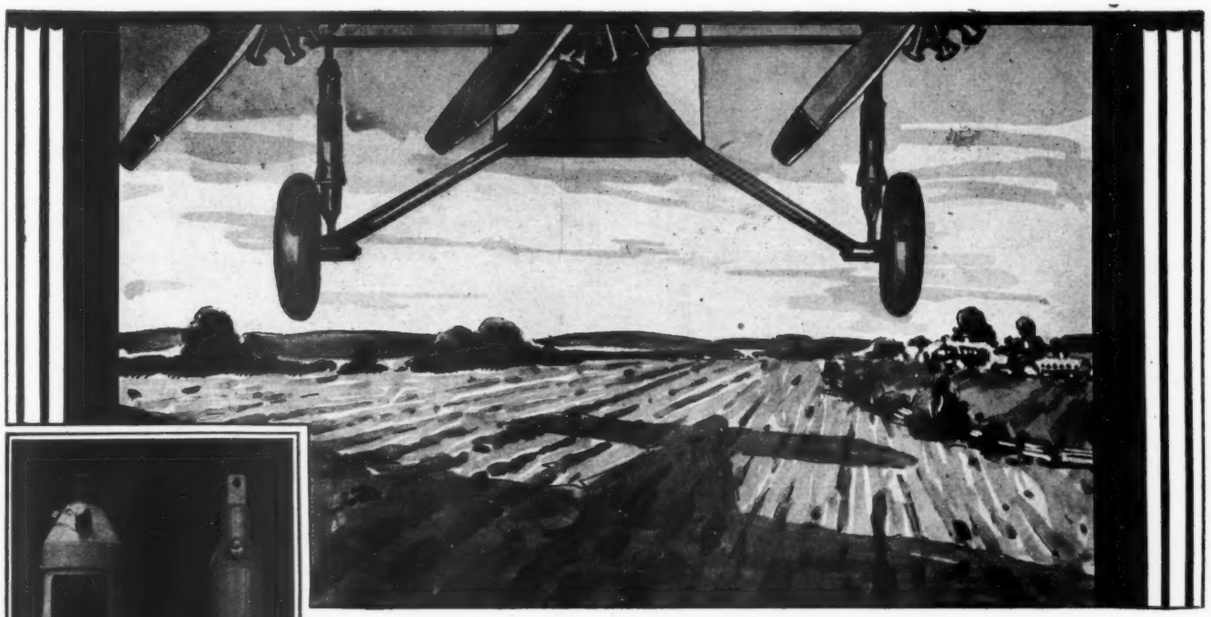

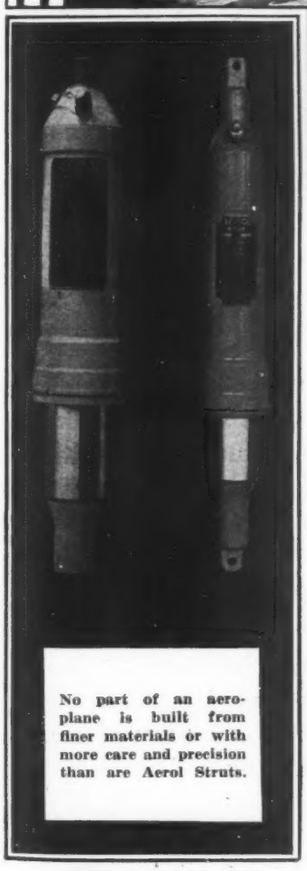

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THE increased acceptance of flying rests upon better control of the plane while being landed under emergency conditions.

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THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGRAW-HILL PUBLICATION . . . ESTABLISHED 1916

EDWARD P. WARNER, *Editor*

VOLUME 28 . . . *June 21, 1930* . . . NUMBER 25

Times Change and We Change with Them

A MESSAGE TO EVERY *AVIATION* READER

FROM the disturbances of the last two years the aircraft industry emerges with a clear understanding of its own position. The tempo is changing. We are breaking away from the fallacious and feverish notion that everything is going to be different day after tomorrow. We are making progress, and it is an orderly progress, not a series of startling leaps first in one direction and then in another.

And that is all to the good. Booms and depressions are nice and exciting, but they are bad for the nerves and worse for the balance sheet. Steady growth is surer and more profitable. Let's quit talking about a "slump." We have seldom used the word in the past. We shall do so still more infrequently in the future. Its employment suggests that the present state of affairs is to be followed by another unpredictable and giddy climb to the clouds, succeeded by another violent nose-dive into an abyss of despond, and so on indefinitely. No such tempestuously thrilling events lie before us. We are engaged in a period of readjustment corresponding to the disposition of a considerable amount of over-produced and unsold stock. It is a necessary prelude to the re-establishment of normal conditions and the subsequent steady and normal expansion of demand and supply of aeronautical services.

We are finding out where we stand, and so is the general public. No longer do they regard us with awe as gallant gamblers with fate or as makers of weird mysteries. We are known now as purveyors to a growing public need, and we are judged by the same standards to which other manufacturers and merchants are subjected.

Although the industry is not for the time being increasing its production, it is improving its organization. Its sub-divisions of interest are sharpening. The aircraft industry is not a single business nor the object of a single profession, but the aggregate of many, all bound together by a certain common interest.

The leaders of aircraft manufacture, of aircraft transport, and of all the innumerable forms of aircraft operation are making time to study their own jobs from the fundamentals up, to improve and to strengthen the foundations of their own knowledge, and to learn how others handle problems similar to their own.

All this has its effect on aeronautical publishing. It creates new needs and a new attitude towards the trade press, and we are moving to meet them. A trade or a professional magazine is not a static observation post, but an intelligence division moving forward with the van of the industrial army. We are preparing to move forward now.

Beginning with the August issue, to be distributed shortly before the first of that month, AVIATION will appear monthly instead of weekly. With the increased scope so offered and with the confidence that the reader will have more time to devote to the individual copy of the magazine, we can give to the important trends and occurrences in the aeronautical field a more carefully detailed feature treatment than has been practicable under the stress of weekly issue. We shall preserve the

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features that have distinguished AVIATION in the past, and several new ones for which space has hitherto been lacking will be added. Surveys and interpretations of the course of the industry and of aeronautical development will be more frequent than ever before.

General trends in the industry and feature stories can both be presented better upon this new basis. Current news, however, demands a more immediate presentation, in a compact and handy form. As a supplement to the service to be rendered by the new AVIATION there will appear upon July 12 and weekly thereafter *The Aviation News*, a concise report of what is going on from day to day and of its interpretation.

A single editorial cannot reveal the full implication of so important and novel a development of policy. We have given you, our readers, an idea of *why* we are making the change, growing as it does naturally out of the industry's own development. In the near future we shall have more to say about *how* we are making it.

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The Public's Response

A YEAR ago American aeronautics were suffering from an excess of ill-judged optimism. It had become a species of treason to express the slightest concern for the future, and pressure of the moment left little opportunity for forecasting in any case. This spring we have been in danger of the far more serious ill of unrestrained gloom. The bearer of evil report has been gleefully welcomed, and the darkest rumors have passed current without pause for investigation. Too many of us seem not only to have abandoned the search for good news, but to have become unwilling to recognize it when it is thrust upon our attention.

There have been plenty of disconcerting events in 1930, and we would be the last to suggest that they be ignored or belittled, but they make only a part of the budget of aeronautical news. The outstanding fact of the year is that the American public has taken to flying. Great economic problems remain. Operating costs and income will have to be brought into accord with each other, and work for the improvement of reliability and safety will have to go on unchecked, but in the meantime the public is flying. Not all the public. An enormous further increase in traffic is possible and must be had, but the gain since last summer is immensely encouraging. Although it is hard to make comparisons, since so many lines were just starting or had not started a year ago, it is safe to say that normal traffic has increased at least sixfold, if not ten, in that period. It has been multiplied by four since last October, and every month this year has shown a substantial increase over the preceding one. For 1929, revenue-producing passenger traffic on American air lines aggregated some fifty million passenger-miles. For 1930, according to the present outlook, it should reach two hundred million, or about double the total for the whole world last year.

For this spectacular change of attitude of the potential passenger there are several causes. Reduction of fares comes first to mind, and undoubtedly stands first in importance, but of only slightly less significance is the gradual disappearance by attrition of the inertia that opposes every new idea. Independently of fare and fear and of every other quality, the traveling public needed time to get used to the notion of flying. It is sinking into their consciousness now. We are reaching the final stage of the development of public psychology toward aviation matters. The slogan of a year ago, "Change air-mindedness into air-activity" is becoming a fact.

Although we must continue to make further headway in the same direction and the battle is only partly won, our problem henceforth is only incidentally psychological, primarily economic. Aircraft will survive in service in which they can pay their way and show a return to the user and they must ultimately do that without direct governmental support. Subsidies are often a necessary transition measure, but as a permanent foundation they are of dangerous instability. There has been talk from time to time of the need of the moment being primarily for designers, or for production men, or for salesmen, or for operators. At present we have to have all four, but responsibility for the future lies largely on the technical side. The salesman must reach the numerous individuals and industries who can make use of the present-day airplane under conditions profitable to all concerned and convince them of that fact. At the same time, the factory must evolve a craft that, by virtue of cheapness of construction, simplicity of operation, immunity from accidental damage, and cheapness of maintenance will be profitable where present-day types are not.

The purchasing public has begun to know something about airplanes, and genuinely to accept flying as a normal incident of life. In the summer of 1930, more than ever before, the salesman needs to be equipped with assured facts in place of romantic scenarios and high-pressure propaganda. For 1931 and all succeeding years, it is the task of the engineer and the manufacturer to brighten up the facts with which the salesman is to be armed for his trip upon the road.

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Speed!

THE SLOWEST airplane exceeds the normal pace of any other vehicle. Even the earliest commercial machines have been almost beyond competition from any form of surface transport. But there has been one rule that has been constant through transportation history. However fast you go, it is not fast enough. How-

ever much the of a new conveyance exceeds anything known before, it takes only a few months for its habitual users to become blaze.

In 1921, conventional cruising speed as represented by the air mail plane was about 90 miles an hour. In 1930 it has been raised to 120 on many lines. Through all that period the aspiration to 200-mile cruising has been common. If 200 miles had been attained, the cry would have been for a figure still higher. There is no level of permanent satisfaction, and there is no particular figure that the traffic demands. The demand, in fact comes more from the pilots than from the customers of transport lines. There are many factors that may prevent particular individuals from using a particular air line at present, but lack of speed is hardly among them.

Of course increased speed is intrinsically desirable—if it can be had without too much sacrifice. Though travelers by air may feel that the transport planes of the present day go quite fast enough to justify their regular patronage, still, other things being equal, they would be glad to go much faster. More speed is desirable, but it is not in most cases the vital factor in determining commercial success. Whether or not it is worth while to pay the price for securing it is a matter for the user of the airplane, who pays the bills for maintenance and fuel, to determine.

A year ago the urge towards higher velocity was particularly strong. It had become the issue of the hour, and the numerous designs of extreme speed characteristics that have either been produced in the last six months or are in early prospect trace their urge in part from that era, in part from interest in the commercial competitions at the Cleveland races last year and in the plans for the meet at Chicago. Their number includes some brilliant examples of the designer's art. Whether his skill is better displayed in that way or in ameliorating some other quality of the plane remains open for investigation, and no single answer will fit all cases.

There are three ways of increasing the speed of an airplane. Aerodynamic efficiency can be increased by cleaning up the design and using better forms, more power can be employed, or wing surface can be clipped. The first is admirable under all circumstances. The second is opposed to economy and must be practiced with discretion. The third cannot be carried very far without becoming definitely objectionable because definitely dangerous.

Other things being equal,—such things as power, weight, and wing area,—the average speed of airplanes has been increased about ten per cent in the last eight years. In some cases the increase above the average attained in 1922 with a given power and wing surface runs as high as 20 per cent. That is clear gain, for which we thank the engineer. For it, no price is paid except perhaps in crowding of passenger accommodations or in production cost. We want more progress in the same direction.

The increase of power is always the easy road to performance. Thanks to the achievements of the engine designer, it has been a road commonly followed. If we have learned anything at all this spring, it should be that we need more economy in operation, and one way to get economy is by carrying more weight for less power. This blithe practice of sticking in five hundred hp. instead of three must be held within reason to make air transport self-supporting.

There remains wing loading. Like the increase of engine power, that is too easy, and therefore too attractive. We can always go faster if we are willing to land faster. Present conditions do not sanction further progress in that direction. Seventy- and eighty-mile landing speeds have no place in ordinary civil flying. No matter how much the customers for airplanes want speed, they must make it plain that they do not intend to accept it at that price.

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More About Air Mail Certificates—An Editorial Correction

RE-READING our own comment on the Watres bill regulation in last week's AVIATION, we fear lest a condensation of statement and a merging of two different ideas might have proved misleading. We proceed to amplify.

The equivalent of a direct and substantial passenger subsidy under the Watres act may be given under either of two conditions. An existing air mail operator carrying a very small amount of mail may find that it becomes practical and expedient for him to carry passengers, and that with a mixed load the very high compensation for the air mail, at a rate of about $5 per ton-mile, will make it worth while for him to carry passengers even at very moderate fares, and will offer him the equivalent of a very liberal subsidy. That applies only to a limited number of cases of existing air mail contracts that have been valid for two years. On the other hand, the Postmaster General may at his discretion assign air mail certificates to existing routes, and in that case the maximum payment fixed by law is forty cents per mile, or for the average transport airplane from five to six cents per passenger-mile. The Post Office Department will, of course, be able to give contracts at less than the maximum imposed by law after competitive bidding, but still favoring the existing operator of a passenger line to any extent the Postmaster General may think desirable.

The figures given in the issue of June 14 thus represent the legally available and indeed the probably effective subsidies, but assistance may be given at materially lower rates in some cases. The precise result both in compensation per ton-mile for mail handled and in apparent subsidy per passenger-mile will depend on whether the line is an old or a new one.

Racing Seaplanes . . . PRESENT

The Macchi seaplane, winner of the 1926 Schneider Cup Race

NOW that the Schneider Trophy Race for 1929 is definitely a thing of the past, the question "What next?" naturally arises. Insofar as America is concerned the question must justly be considered one of considerable magnitude. In European countries, especially in Great Britain and Italy, the problem is much less serious because of their more recent completion of more or less successful racing programs but even in these countries the military authorities, at least, have definitely stated their intention of withdrawing from future participation in the Schneider Trophy Races.

These statements were made immediately subsequent to the last races and were probably largely influenced by popular clamor following publication of data regarding the costs of such programs. The policy has since been roundly attacked in the British aeronautical, technical and trade press and will probably, in addition, be influenced by the results of the present disarmament conference. Any curtailment of the size or number of surface vessels, or, in fact, of land armaments, will inevitably turn attention to the air services. Portions of funds normally expended for other military uses will be applied toward aeronautical development, of which, by no means the least important, will be that of high speed planes. It would therefore seem to be almost certain that the announced policy of other countries will be considerably modified by recent and future developments, if, in fact, these policies were not published in the guise of "herring drawn across the trail."

THE QUESTION of the value of racing in aeronautical development has been discussed elsewhere in great detail (AVIATION, August 24, 1929), but without the establishment of conclusions which are universally accepted. It is not the purpose of this article to enter this particular controversy except to point out one or two features which have, as yet, not been stressed. It is a fundamental experience of man in combat with his enemies that, other things being equal, the combatant who has the advantage of superior speed is the eventual victor.

Similarly, it will be the pilots of the air force possessing the fastest planes who will be the most successful in warfare. They will be able to fight or avoid combat as they choose and their one asset of speed will be of far greater importance than any other factor, such as that of superior numbers. Since progress in racing design will affect all types of planes, it is to be expected that this asset of greater speed, with its accompanying advantages, will be possessed by all types of planes from the smallest fighter to the largest bomber and transport plane. Racing development would therefore seem to be invaluable from the standpoint of national defense, if indeed, it lacked justification from a commercial standpoint. In this field an increase of 10 m.p.h. in the high speed of commercial planes (without increase of landing speed) would be of revolutionary consequence. Such development, as a result of racing plane building is not impossible.

IN THE CASES of England and Italy, the development of new racing planes may be expected to be a continuation of past experiments. Assuming that the next Schneider Trophy will require a speed of 400 m.p.h., their problem is simply that of increasing the speed of present planes by from ten to fifteen per cent. This problem is by no means a simple one but its solution lies in the method formerly used, in this country, in developing racing planes. It will be remembered that the first Pulitzer racers were simply "dressed-up" pursuit planes while subsequent racers were refinements of the preceding winners. When America entered the Schneider Trophy contest, floats were fitted to the Pulitzer winner of the preceding year and the Trophy came to America

AND FUTURE

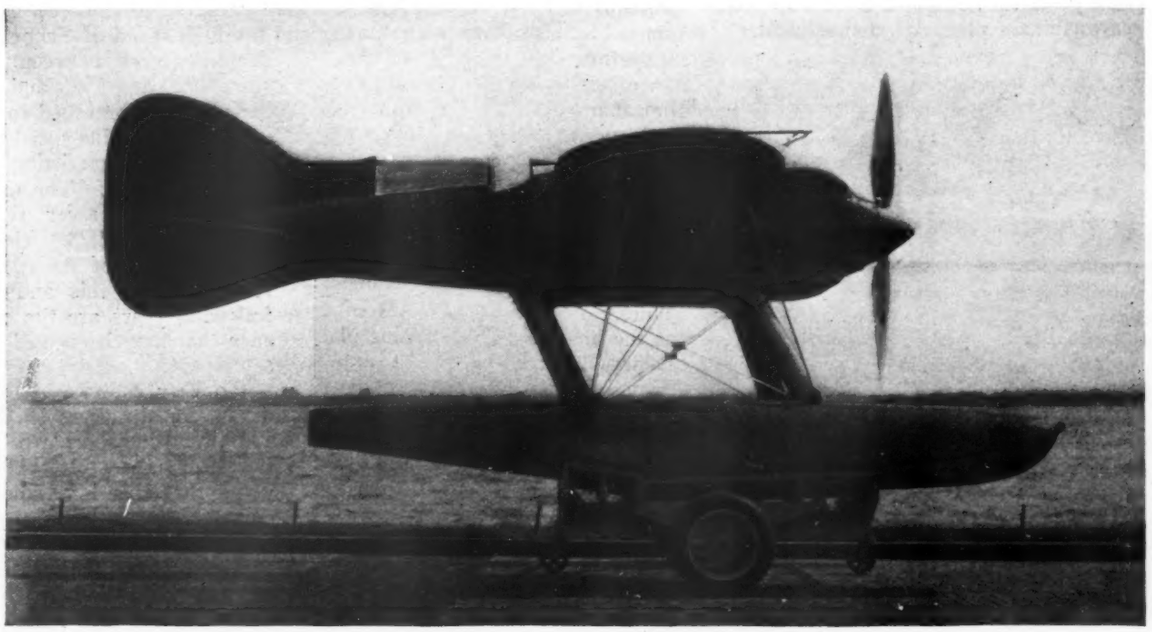
By JOHN S. KEAN
Project Engineer
Naval Aircraft Factory

In presenting this, the first of a series of three articles on the subject by Mr. Kean, we feel that we are offering our readers something more than the title implies. These articles contain advice helpful for any aircraft designers in the problem of attaining increased performance. They also represent the experience of a man who has been project engineer on all racing plane designs at the Naval Aircraft Factory. ¶*Although none of the technical problems of the subject are omitted, Mr. Kean's treatment is such that the material should be interesting not only to the engineer but to the general reader.*

where it was retained until 1926. In that year the American planes were, in accordance with a policy which had by that time become traditional, modifications of the Pulitzer and Schneider Trophy winners of preceding years, but were completely outclassed by the Italian planes designed especially for that Schneider Trophy contest. Since that year, American racing development, on a scale commensurate with that in Europe has been non-existent.

The situation as it exists in America today is not of such nature as to induce optimism. There are no planes, military, commercial or privately owned, with a demonstrated high speed in excess of approximately 217 m.p.h. and very few with speeds greater than 160 m.p.h. There are no pilots with recent experience in racing planes and not more than about a dozen with any such experience. There are no engines with a rated power in excess of 1,300 hp. and with the exception of the Packard "X" type engines, of which two have been built, no aircraft engines with rated power in excess of about 800 hp. have ever been produced in America nor have the problems incidental to the use of high compression ratios been satisfactorily solved.

The problem is thus not only that of developing the technical features of racing planes and engines but also that of training pilots and obtaining the planes for such training. It is unthinkable that pilots, without previous experience in planes with a minimum speed in excess of 65 m.p.h. or a high speed exceeding 200 m.p.h. or with floats the reserve buoyancy of which is less than 70 per cent, be expected to step into and fly a racing plane, landing at possibly 115 m.p.h., with a reserve buoyancy of only 50 per cent and with other unusual characteristics incidental to high speed. In Europe, present racing



The 1929 Mercury Racer, an example of the reduction of drag obtainable by careful fairing of surfaces, fuselage and struts

planes may be used for this training. There are, however, no such planes in America. It is not the purpose of this article to discuss at length, the personnel aspect of future racing policies except insofar as it affects the problem of obtaining satisfactory training racing planes. The latter is important and must be considered for any future racing program.

However, the most pressing problem is that of the development of racing planes within the limits of time and funds available. In order that both may be conserved to the greatest possible extent, it is essential that all possible types of racing planes be carefully considered and the design and the experimental work be carefully planned. A critical examination of problems presented by America's participation in the next Schneider Trophy race is, therefore, much in order at this time.

A broad statement of the problem involved in the successful participation of an American team in the Schneider Trophy races of 1931 may be outlined as—(a) providing racing planes and alternate planes capable of straight away speed of 400 m.p.h., adequate as to number, of proven reliability and with ample spare parts: (b) providing pilots and substitute pilots carefully selected and thoroughly trained in racing planes and (c) initiating the program in ample time to complete all test and construction work without undue haste and hence increased costs and decreased efficiency. An historical review of the past few years will indicate the trend in development.

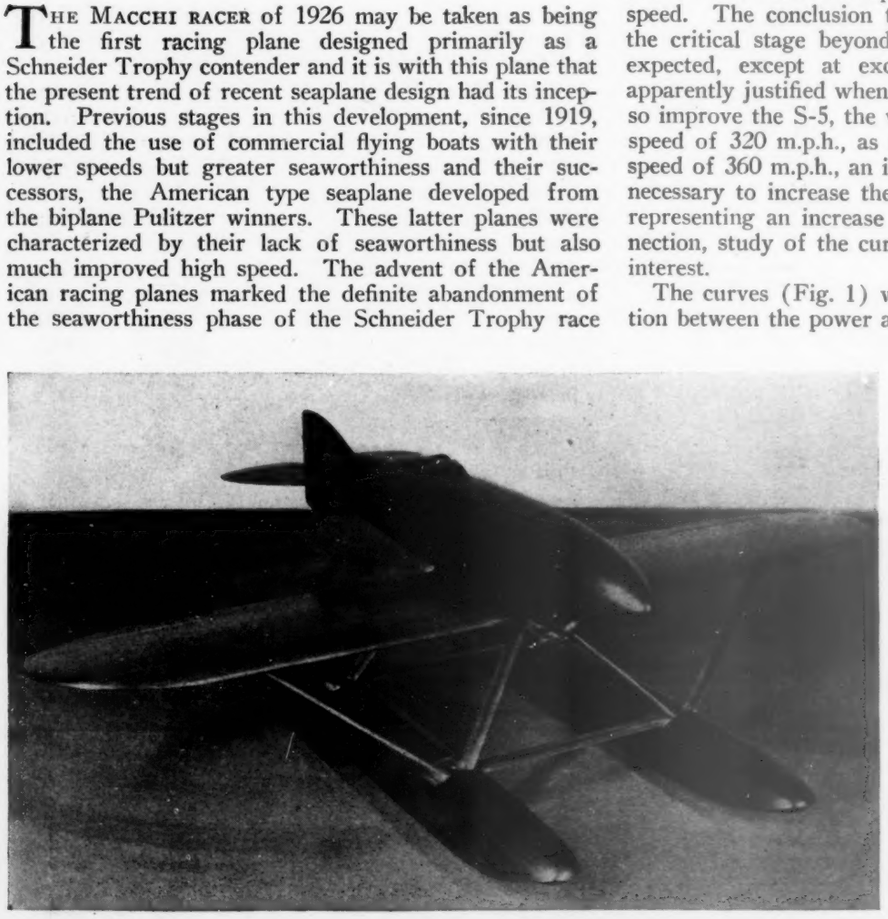
THE MACCHI RACER of 1926 may be taken as being the first racing plane designed primarily as a Schneider Trophy contender and it is with this plane that the present trend of recent seaplane design had its inception. Previous stages in this development, since 1919, included the use of commercial flying boats with their lower speeds but greater seaworthiness and their successors, the American type seaplane developed from the biplane Pulitzer winners. These latter planes were characterized by their lack of seaworthiness but also much improved high speed. The advent of the American racing planes marked the definite abandonment of the seaworthiness phase of the Schneider Trophy race in favor of the speed element. True, the race still includes navigability trials and mooring out tests but these are carried out under such conditions as to favor the planes as much as possible. A plane with a landing speed of 100 to 115 m.p.h. and a reserve buoyancy of only 50 per cent can scarcely be said to be a craft to be safely operated from any but the smoothest bodies of water. The greatest improvement made by American planes lies in the use of skin or surface radiators located on the wings. Such radiators in various forms have been essential features of all subsequent racing planes.

The Macchi planes marked the next improvement in racing planes. These monoplanes were mounted on curved bottom floats which were noteworthy for their somewhat improved water performance as compared to that of American planes and were also the first to use a thick double cambered wing profile characterized by small center of pressure travel. The various English planes, such as the S-5 and S-6, and the Italian racers designed since 1926 have been essentially developments of the original Macchi plane.

FROM EXAMINATION of these types of racing planes it is evident that the biplane type of seaplane displaced the flying boat only after the latter had been so developed as to be capable of but little further improvement. The biplane with its more complicated wing bracing and possibly less efficient arrangement of surfaces was in turn displaced by the more efficient monoplane after the former had been developed to the limit with respect to speed. The conclusion that the latter is now reaching the critical stage beyond which little progress may be expected, except at excessive increases in power, is apparently justified when it is considered that in order to so improve the S-5, the winner of the 1927 race, with a speed of 320 m.p.h., as to obtain in the S-6 of 1929 a speed of 360 m.p.h., an increase of 12.9 per cent, it was necessary to increase the power from 900 to 1,900 hp. representing an increase of 117 per cent. In this connection, study of the curves shown in Fig. 1 will be of interest.

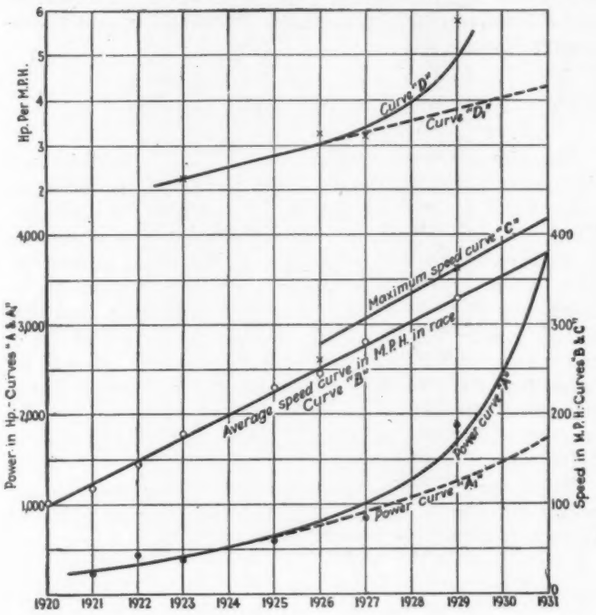
The curves (Fig. 1) were prepared to show the relation between the power and the high speed of Schneider Trophy racers between the years 1920 and 1929 and the curves were continued to indicate the probable speed and power characteristics of planes for 1931. The modern Schneider racer really dates from 1923. Hence those portions of the curves for planes of this and the following years are the only ones that may be considered significant.

Power curve A_1 was drawn for the years 1920 to 1927, ignoring the power for the 1929 racer. It will be noted that this is a smooth curve with a relatively uniform curvature. Power curve A shows the influence of the exceptionally high power for the 1929 racer. It is interesting to observe that the speed for the Schneider



Model of an airplane which was never built but was designed to obtain reduced drag by fairing the cylinders of the engine and the float struts into the leading edge of the wing

Fig. 1: Relation between power and high speed of Schneider Trophy racers 1920-1929


Hp. Per M.P.H.
Curve "D"
Curve "D1"
Maximum speed curve "C"
Average speed curve in M.P.H. in race
Curve "B"
Power Curve "A"
Power Curve "A1"
Power in Hp.-Curves "A & A1"
Speed in M.P.H.-Curves B & C
1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931

Data for Plotting Curves A, A_1, B, C, D, and D_1

Year	Plane	Horse Power of Engine	Speed M.P.H. Max. Speed for Course	M.P.H.	H.P./M.P.H.
1920	Savoia	450	102.0	....	....
1921	Macchi	250	110.0	....	....
1922	Sea Lion II.	450	145.0	....	....
1923	Curtiss Racer	400	177.0	....	2.26
1924	.....	No Race	.....	....	....
1925	Curtiss Racer	620	232.0	....	2.67
1926	Macchi	800	246.0	260.	3.25
1927	Supermarine	900	281.0	320.	3.28
1928	.....	No Race	.....	....	....
1929	Supermarine	1900	0328.	360.	5.80

Trophy course has been changing at a rate indicated graphically by a straight line as shown in curve B. There is no change in direction of this curve corresponding to the abrupt change in curve A. Curve C is a graph of the maximum high speeds of later planes. Curve D and D_1 were plots of points obtained by dividing the actual power required as plotted for curve A by the actual course speed as plotted for curve B. If, as was done in the case of curve D_1, the plot of the ratio for the 1929 plane is ignored, the relationship is indicated by a straight line. However, if the plot for the hp./m.p.h. ratio for the 1929 racer is considered, the straight line relation no longer holds.

Consideration and comparison of curves A, A_1, B, D and D_1 indicate the exceptional relationship existing between the speed and the power of the S-6 as compared to former racers. It is apparent that if former racers may be taken as a criterion the S-6 was quite inefficient.

The amazing high power requirements of the S-6 as compared to the S-5 may, however, be explained by the apparent policy of the British designers in developing the S-6 from the S-5 by increase in power alone, accepting the greatly increased size and weight without attempting to improve the aerodynamic qualities of the plane. It is probable that relatively larger floats with greater reserve buoyancy were used on the S-6 in order to improve the water performance. It is also possible that in order to obtain sufficient thrust at low speeds to permit the plane to leave the water, the propeller efficiency at high speeds was sacrificed. That these considerations are not without foundation may be gathered from comments in press dispatches which stressed the large size of the S-6, comparing it unfavorably to the smaller, trimmer, Gloster racer and which mentioned that the former would not leave the water until the original propeller had been modified. The relatively low speed of the S-6 must not be taken as absolute evidence that the further improvement of the high speed of the monoplane at reasonable increase in power is impossible. It is evident, rather, that if the apparent excessive drag and low propeller efficiency can be overcome, the British should be able to secure a 400 m.p.h. plane, using the present Rolls-Royce engines, since curve A_1 indicates that the present 1,900 hp. should be ample for a plane of this speed.

Previous to the last Schneider Trophy race, that of 1929, it was evident that the winning plane would require a straightaway high speed of approximately 360 m.p.h. In order to anticipate the characteristics of such a plane, the writer analyzed the winner of the 1927 race and attempted to arrive at a reasonable method by which, in the absence of wind tunnel data, to make an estimate of the power requirements of a plane of this speed. The situation as it then existed was that the British had in the S-5 a plane capable of 320 m.p.h. and powered by a 900-hp. engine which was reported to have a compression ratio of 10 to 1. For reasons, discussed elsewhere, it seemed evident that no great change in the power available in the engine could be expected except with accompanying increased size of the power plant and increased fuel load. The logical assumption was that the lines of S-5 would be expanded in the ratio of the change in power and that the change in weight would also be proportional to the change in power. Lastly, in the interests of simplicity, the new plane was assumed to have the same wing and power loading as the S-5. The assumption regarding power loading was known to be a source of possible error since experience has shown that power loading decreases as the power increases, because the weight, and hence the power loading, normally increases less rapidly than the power. Using the assumption of the direct relationship between increase in weight and increase in power, therefore, introduced errors which would seem to indicate greater power than would actually be required. The resulting figure was therefore considered to be conservative.

Under these conditions the following relation may be developed:

$$P_1 = \frac{V_1 P}{V}\left[0.7\left(\frac{P_1}{P}\right)^{\frac{2}{3}} + \frac{0.3\,P_1}{P}\right] \qquad (2)$$

This formula may be developed as follows:

Let P_1 and P be, respectively, the power required for the new plane, of maximum speed V_1, weight W_1 and Drag D_1, and of the plane with which the new plane is to be compared, with maximum speed V, weight W and drag D.

$$\text{By assumption, } \frac{P_1}{P} = \frac{W_1}{W}$$

The $D = d_B + d_F + d_W$ in which d_B, d_F and d_W represent respectively the drag of the body, float and wings of the original plane. Similarly, $D_1 = d_{B1} + d_{F1} + d_{W1}$ in which d_{B1}, d_{F1} and d_{W1} represent the drag, respectively, of the body, floats and wings of the new

plane. For a racing plane the following relations may be assumed:

$d_B = 0.35D$, $d_F = 0.35D$ and $d_W = 0.3D$ and
$d_{B1} = 0.35D_1$, $d_{F1} = 0.35D_1$ and $d_{W1} = 0.3D$

The weight and hence the volume of the engine may be assumed to increase as the power. Hence the cross-sectional area increases as the two-thirds power of the increase in power. Since the cross-sectional area of the body is fixed by the size of the engine, the drag of the fuselage varies as the change in cross-sectional area or as the two-thirds power of the change in power. Hence,

$$\frac{d_{B1}}{d_B} = \left(\frac{P_1}{P}\right)^{\frac{2}{3}} \text{ or } d_{B1} = d_B\left(\frac{P_1}{P}\right)^{\frac{2}{3}}$$

Similarly, the displacement or volume of the floats is a function of the weight of the plane and hence increases as the increase in weight. Since, too, $\frac{W_1}{W} = \frac{P_1}{P}$ the displacement varies as the power. Displacement represents the volume of a three-dimensional body the cross-sectional area of which varies as the two-thirds power of the change in volume and thus in weight. Since the drag of the floats is proportional to their cross-sectional area, the drag also varies as the two-thirds power of the change in weight or

$$\frac{d_{F1}}{d_F} = \left(\frac{W_1}{W}\right)^{\frac{2}{3}} = \left(\frac{P_1}{P}\right)^{\frac{2}{3}} \text{ or } d_{F1} = d_F\left(\frac{P_1}{P}\right)^{\frac{2}{3}}$$

The drag of the wings increases with the area of the wing. Since the wing loading is assumed constant, the area and hence the drag of the wings vary as the change in weight and hence, since

$\frac{W_1}{W_1} = \frac{P_1}{P}$ as the change in power, or $\frac{d_{W1}}{d_W} = \frac{P_1}{P}$

$$d_{W1} = \frac{d_W P_1}{P}$$

Then, substituting in the formula
$D_1 = d_{B1} + d_{F1} + d_{W1}$, the values derived above

$$D_1 = d_B\left(\frac{P_1}{P}\right)^{\frac{2}{3}} + d_F\left(\frac{P_1}{P}\right)^{\frac{2}{3}} + \frac{d_W P_1}{P}$$

But $d_B = 0.35\,D$,
$d_F = 0.35\,D$
and $d_W = 0.30\,D$. Hence

$$= 0.7D\left(\frac{P_1}{P}\right)^{\frac{2}{3}} + \frac{0.3DP_1}{P}$$

$$= D\left[0.7\left(\frac{P_1}{P}\right)^{\frac{2}{3}} + \frac{0.3P_1}{P}\right]$$

But the power in hp. required to move any body at a speed V (in m.p.h.) is

$$P = \frac{KDV}{375} \text{ if } d \text{ is the unit drag in pounds}$$

or $$d = \frac{375\,P}{KV}$$

Thus, $D_1 = \frac{375\,P_1}{KV_1}$ and $D = \frac{375\,P}{KV}$

And $$\frac{375\,P_1}{KV_1} = \frac{375\,P}{KV}\left[0.7\left(\frac{P_1}{P}\right)^{\frac{2}{3}} + \frac{0.3P_1}{P}\right]$$

Since the planes were assumed to be geometrically similar, K is the same for both sides of the equation and the above equation reduces, by cancelling and transposing terms, to

$$P_1 = \frac{V_1 P}{V}\left[0.7\left(\frac{P_1}{P}\right)^{\frac{1}{3}} + \frac{0.3\,P_1}{P}\right] \qquad (1)$$

Substituting known values for P and V (in this case the power and high speed of the S-5) and the assumed value for V_1, the value for P_1 is shown to be 1,450 hp. This is therefore the power indicated to be necessary to obtain a high speed of 360 m.p.h. in a plane geometrically similar to the S-5. This figure was known to be inaccurate but the discrepancy between this and the actual power requirements of the S-6 (1,900 hp.), amounting to 30 per cent, was surprising. It will be noted that the power thus calculated is somewhat larger than that shown on power curve *A*. Fig. 1, for the race of 1929. The figure shown by this curve is 1,250 hp.

The actual relation between the power required at maximum speeds for the S-5 and S-6 may be obtained from the relation

$$\frac{V_1}{V} = \frac{P_1{}^n}{P} \qquad (2)$$

whence substituting known values for V, V_1, P and P_1

$$n = 0.158.$$

This figure indicates that the change in speed is a function of approximately the sixth root of the change in power in planes of the type of the S-5 and S-6. The significance of this figure is the better shown if the power required to obtain 400 m.p.h. in a plane similar to the S-6 calculated from formula (2), whence

$$P_1{}^n = \frac{P^n V_1}{V}$$

Substituting known values of V and P, the assumed value of V_1, and the value of n established above

$$P_1 = 3{,}700 \text{ hp.}$$

Solving for P_1, in the case of the 400 m.p.h. plane, using formula (1), results in

$$P_1 = 3{,}000 \text{ hp.}$$

Thus, the power required in a plane similar to the S-6, capable of attaining a speed of 400 m.p.h. has been calculated by two independent approximate methods, the greater result being approximately 23.4 per cent greater than the smaller indicated power. It is probable that the actual power required for the plane built along the lines of the S-5 and the S-6 would be in the neighborhood of 3,400 hp., unless steps are taken to overcome any existing inefficiency of the propeller.

In any case, these power requirements or any indicated power in excess of 2,000 hp., are of such nature as to make the provision of a suitable engine within the time and financial limits prohibitive. The reasonable policy would, therefore, seem to require breaking away from conventional or traditional methods of development and by surveying the field of possible sources of improved performance, endeavor to obtain the 400 m.p.h. plane by the use of new methods of construction and new types of planes.

Voice OR *Code* IN AIRCRAFT RADIO?

By W. G. LOGUE
Commercial Manager, Radiomarine Corp. of America

MOST of the largest air transport companies in this country have come to realize that it will be necessary for them to use a two-way radio communication system if they are successfully to compete with other methods of transportation. The decision to adopt two-way radio immediately gives rise to the question as to the method which will provide the type of service required.

The choice seems to be limited to one of three systems:

1—Two-way radio telephone communication.
2—Two-way radio telegraph communication.
3—Two-way combined telegraph and telephone.

An analysis of the three systems indicates that each of them has its advantages and disadvantages. Each has its special application which it seems to fill in a manner not paralleled by the others.

In transport service, there are only two main types of planes, mail and passenger. The small mail plane is essentially a one-man carrier and will probably so continue for some time, while passenger planes usually have at least one man in the crew who is available for some duty other than that of flying the ship. This of course does not apply to all passenger carriers, but it is the general rule.

It is a fact, and a generally known one, that radio telephone equipment capable of carrying on reliable voice contact with radio telephone ground stations spaced as much as 200 miles apart is and probably always will be an inherently complex and weighty apparatus. If voice communication is considered essential in the operation of a radio service, transport companies must resign themselves to the carrying of considerable weight, the assignment of adequate space for the apparatus in the planes which are used, and a rather high first cost and maintenance. Radio telephone equipment in the plane will permit the pilot to talk directly to his company's headquarters station under certain conditions, where the distances are not too great and where the interference from static and other stations is small.

Tests indicate that it is dangerous to generalize on the ranges to be expected from this type of equipment. The nature of terrain, type of soil, altitude of plane, the transmitting frequency used, type of antennae, etc., all contribute to the success or failure of the communication. It might be said, however, that intelligible daylight transmission can ordinarily be carried on with the telephone under the most favorable conditions of atmosphere, frequency, altitude and antenna at distances up to 110 miles when using an output of about fifty watts. Under less favorable conditions, signals may become unintelligible at less than half that distance. Two way radio telephone has not been used enough in regular transport service on other than experimental basis to permit an exact statement of performance to be expected, and because of this lack of wide commercial application definite statements on reliability, percentage of completed communications under service conditions, and costs of maintenance cannot be given at this time. It can be stated, however, that one large transport company carried on extensive tests with the radio telephone to and from its planes before it decided to drop the idea and adopt a complete radio telegraph system. The Army and Navy have endeavored to make use of radio telephone in their plane-to-ground and

The battle of communications goes on unchecked. Pan-American says one thing, and Lufthansa agrees. T.A.T. says another, and its vote coincides with that of Imperial Airways. The layman, to whom Morse code is weirder than Swahili and who learns about radio from Amos 'n' Andy, will unhesitatingly proclaim the superiority of the telephone over telegraph. Mr. Logue holds a very different opinion.

ground-to-plane services, without notable success. Practically all of the military aircraft communications in the United States are carried on by radio telegraph.

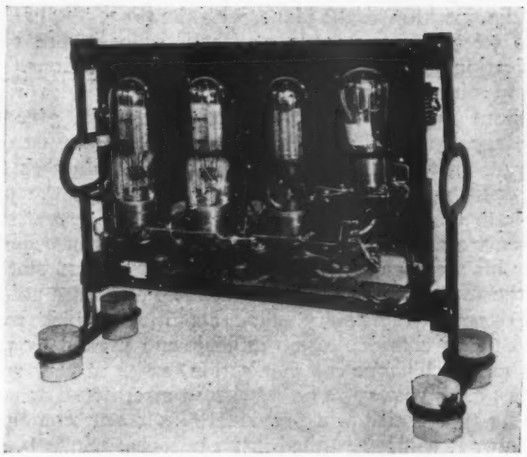
RADIO TELEGRAPH transmitting apparatus of very light weight and low power requirement has been developed, and is capable of insuring the same range as radio telephone equipment of much greater weight and higher power. The telegraph transmitters employed on the planes on one of our longest routes have an output of from 12 to 15 watts, and under adverse atmospheric conditions maintain consistent service at distances of more than 125 miles. Here too, the various factors make it difficult to lay down specific distances to be expected, but as a rule where the two types of transmitters of equal power output are used and operated under similar conditions, the telegraph will provide communication at three to four times the distance covered by telephone.

A direct comparison of total weights to be expected in modern aircraft telegraph and telephone equipments for two way communication is apt at this point. In all instances where the 20 watt telegraph transmitter is mentioned in this comparison it should be remembered that the set is designed for *both* telegraph and telephone operation, but that the distance to be obtained when the telephone feature is used is rather limited when compared to that obtained with code. The total weight of all of the apparatus in the plane required for two way radio telephony with 50-watt output is figured at approximately 129 pounds. This figure includes the transmitter, the receiver and all accessories except the antenna. On the same basis all equipment required for two-way telegraphy of 20-watt output, which has a greater range than the 50-watt telephone equipment, is figured at 62½ pounds. These figures are arrived at on the assumption that each transmitter will operate from a dynamotor source of supply. If other power sources should be found more desirable the total weight might change in each instance, but the ratio of weights would remain practically unchanged. The weight of the telegraph transmitter is placed at 11 pounds. The telegraph transmitter with its dynamotor weighs 24 pounds while the telephone transmitter with its dynamotor and starter weighs 66 pounds. No starter is required for the small dynamotor used with the telegraph transmitter.

Practically all of our passenger planes and the larger mail planes carry storage batteries and battery-charging generators for their lighting, even though the planes are not fitted with radio transmitters. The 60-65 ampere hour battery and 15-ampere charger are used as a basis in computing comparative weights because these sizes are used in such quantity that their acceptance as an average standard appears justified. No additional capacity would be required if such planes were to be fitted with the 20-watt radio telegraph transmitter unless the starting and lighting drain was exceptionally heavy, but a larger battery (120 ampere hour) and generator (50 ampere) would be almost a necessity in the case of a plane equipped with a 50-watt completely modulated telephone transmitter if the battery was needed for starting, lighting and radio. In other words the 60-65 ampere hour battery and 15-ampere charging generator would not stand up under the heavy drain occasioned by the use of the 50-watt telephone transmitter. Additional capacity would be required for both units. This means additional weight. Increasing the battery capacity from 65 to 120 ampere hours would be good practice and would increase the battery weight by 30 pounds. Increasing the charging rate from 15 to 50 amperes would also be good practice and quite necessary. It would increase the charger weight 16 pounds. This change of size in battery and charger would entail a gross weight increase of 46 pounds which, when added to the weight of the radio telephone communication equipment, shows a total weight of 175 pounds or 113½ pounds more than the total weight required on the plane for two way radio telegraph operation.

No additional personnel is required in the plane where telegraph is used. In the case of one-man ships, pilots can learn to handle the telegraph equipment within a very short time if they do not already know it, or automatic transmission from the plane to the ground with telephone transmission to the plane can be used during the time that the pilot is taking code instructions. A large number of air mail pilots are ex-Army men who are already familiar with the telegraph code, and they would have no difficulty in brushing up on their code work to the extent required. For multi-motored passenger carriers engaged in route flying, it would seem logical to hire licensed radio operators whose primary duty would be communication with secondary duties as flight escort, courier, steward, engineer or co-pilot. The qualifications necessary for securing a commercial radio operator's license of today are different from those with which a great many Americans became familiar some years ago. The licensed radio operators of today are, as a class, glad to assume additional duties and in instances where the personnel set-up permits this to be done the question of the radio operator's salary as well as the possible loss of

Showing a complete airport transmitter with the doors open



A 100 watt combination telegraph and telephone transmitter in its shock mounting frame

pay load due to the fact that an operator is carried is automatically eliminated.

Messages originating on one-man planes will consist, in the main, of position reports, reports of unforeseen weather conditions and acknowledgments. All of these can be sent by the pilot in telegraph code quicker, and usually with less effort, than when voice is used except at short ranges. Each position report, weather change and acknowledgment can be transmitted to his controlling ground station by one prearranged Morse character. The telegraph communications will usually save time and effort because they are more easily "read" through atmospheric disturbances and through signals from other stations. Voice messages are very difficult ones to "copy" through heavy atmospherics because so many of the voice frequencies approximate those of static. The note of the telegraph signal can be varied to secure best results under conditions of this kind.

It is often suggested that the short wave lengths can be used in order to get away from heavy static. This can be done in certain point-to-point communications, but it has proven impractical in mobile communications, where both long and short ranges are necessary, due to the "skip" effect of these higher frequencies unless means are provided for varying the wave length used on the plane and on the ground station transmitters to offset it. [For some more detailed comment on this point see the report of Herbert Hoover, Jr.'s S.A.E. paper in AVIATION for Mar. 1, 1930, p. 445.—Ed.] These wave length changes would, of course, have to be made on the plane while it is in flight and inasmuch as American radio telephone practice demands remote control of the transmitter in the plane a wave-change system is somewhat complicated. No means for remotely shifting waves in the air has been provided on modern American airplane transmitters. Certain types of telegraph signals are not as subject to the bad effect of skip distance as are the signals from radio telephone transmitters, and the size of the apparatus will permit of its installation in parts of the plane where the desired wavelength changes can be made locally by the operator.

One large air school in the Middle West is now including a course of radio instruction. All student transport pilots will be required to qualify in the telegraph code. The management of the school has visualized the need for 100 per cent communication on one-man ships. They are not thinking of multi-motored ones, for in that case the pilot already has a heavy job and radio cannot be a part of his flight duty. This will apply even more forcefully if the trend to larger planes continues.

As previously stated one large American transport company has discarded all attempts at radio telephone communication with its planes. Another is requiring all of its pilots and co-pilots to learn telegraphy with the idea of equipping its planes with telegraph apparatus as soon as this is accomplished, and at least one of the largest European companies, the Deutsche Lufthansa, invariably uses radio telegraph in its plane communications. The reasons for their choice can probably be listed somewhat at follows:

(a) Radio telegraph apparatus in the planes is less complex than radio telephone apparatus, and is therefore less liable to failure.

(b) It is lighter in weight and less bulky.

(c) It is more economical. This applies to first cost as well as maintenance.

(d) It provides increased reliability of communications because telegraph signals are easier to "read" than telephone signals under bad atmospheric conditions and certain types of telegraph signals are less subject to skipping and fading.

(e) Telegraph signals create less interference. Telephone communications occupy many times as much space in the ether as a telegraph signal. This is important in a service where channels are scarce.

These are matters which will solve themselves in time, as transport executives will sooner or later familiarize themselves with the merits of these systems and if they once become convinced that high-power two-way radio telephone communication with aircraft is an expensive luxury as to weight, cost and dependability under adverse conditions and at long ranges, they will insist on having long-range plane-to-ground telegraph communication and use the low-power radio telephone only when near the airport.

EXPERIENCE gained in other lands is of obvious interest to us. European practice demands the use of trailing wire antennae on the airplanes, and all commercial communications are carried out on the intermediate frequencies. American transport companies as a whole insist on the use of wing antennae and the use of the higher frequencies for communication. European operators do not seem to be as much concerned as ours are about the weight of the radio equipment in the planes. It naturally follows that radio apparatus of greater output is ordinarily used over there. Most of the sets used on European planes have an output of from 70 to 100 watts, although outputs of as low as ten watts are used on some planes where telegraphy is used and for short range telephony. Some very good results with radio telephone have been obtained with this set-up (i.e. trailing wires and intermediate frequencies on rather high power) but practically all of the equipment is arranged for *both* telephone and telegraph operation. The German companies, however, almost always use telegraph rather than telephone in their plane-to-ground and ground-to-plane communications. This obviates the language difficulty, speeds up long-distance communications, minimizes interference and provides a written record of each communication. Some of the large new German planes are fitted with a special compartment for the radio equipment and the radio operator.

In England all airport-to-airport communications are carried out by radio telegraph on intermediate wave lengths (approximately 1,380 meters) and the ground

transmitters in all cases are arranged for both telegraph and telephone transmission so that the same apparatus can be used for telephone communication to planes if found desirable. The antenna output of these ground sets, as well as of the transmitters used for communication with planes, is about one and one-half kilowatts. English planes do not use any high frequency (short wave) transmitters for commercial work. Some experimental work has been done along that line, but the results so far have not warranted a change.

FOR THE ITINERANT or sportsman pilot who does not usually fly bad weather and whose flying is done within a limited area, radio telephone will prove a valuable aid. This is true of all types of flying where only short-range communication is needed. The fact is recognized by radio equipment makers, and the telegraph apparatus which is designed for maintaining long-distance communication will also be arranged for voice communication at short ranges so that the pilot himself can talk to his ground officials when about to make a landing at the airport, just as a steamship captain megaphones to his wharf master and tow-boat captains when he is docking his vessel. The master of a large steamship does not handle his routine long-distance communications throughout the voyage, however, because he is occupied with the safe navigation of his ship. Routine communications are handled by a man especially trained in this type of work—the radio operator. On some small steamships the *mate* is also the radio operator as well and on still smaller vessels the *master himself* sometimes obtains the time tick, weather reports and radio direction.

There are certain portions of the United States in which two-way radio telephone may also be a success in transport work if the ground stations are not spaced too far apart. This will probably prove true of the Pacific Coast and the Northwestern section of the country, where heavy static conditions are practically unknown and where interference is considerably less than in other parts of the country. In the Southern sections, however, as well as in the Great Lakes regions and on the Atlantic seaboard, static conditions from May to September may make any kind of long-range radio communication difficult.

Radio telephone enthusiasts may refer to the excellent radiophone results obtained in the air weather stations of the Airways Division of the Department of Commerce. These transmitters are designed for both telegraph and telephone operation and are rated at 2,000 watts output, operating on frequencies far removed from those on which skip effects are found. The high output was thought necessary for getting weather broadcasts through to the planes under adverse conditions at distances of 100-125 miles.

It may be pointed out that the radio operator cannot take the place of one crew member in all cases, in which event his presence on the payroll must not be overlooked. Flight operators should receive not less than $150 a month, and this expense will have to be warranted before executives will consider hiring them. In order to give this subject fair treatment it must be considered jointly with such matters as equipment cost, maintenance, obsolescence, efficiency of communication and safety. Radio operators are suggested for the large passenger carriers from an economic standpoint because one hundred and fifty dollars a month is considered cheap insurance on the lives of the crew, a large number of passengers and forty to one hundred thousand dollars worth of airplane. A radio operator on the plane, with the proper lighweight radio telegraph apparatus, will practically insure communication at all times and under all conditions. In bad weather the pilot of planes equipped with radio telephone apparatus operated by himself can give the radio apparatus only incidental attention. He must concentrate on flying the ship. It is at such times as this that radio communication is most needed, but the pilot will have neither the time nor the patience to repeat each spoken word as many as three or four times in order to make his message intelligible at a distant ground station. All too often sudden storms and line squalls are accompanied by extraordinary static conditions which make any kind of communication difficult and practically prohibit radio telephone communication except at very short ranges. A two-way radio service in aircraft work must be of a type which will provide 100 per cent communication or it will have failed in its purpose. Seventy-five per cent communication will bring nothing but gray hairs to executives and pilots alike, and nothing short of continuous contact with the plane under all conditions will provide the safety necessary to transport operation. It has been demonstrated through years of operation that radio telegraphy is the surest means of maintaining radio contact at long ranges and under the worst operating conditions.

TWO-WAY remotely controlled radio telephone apparatus in the plane now costs more than three times as much as two-way telegraph apparatus capable of working the same or greater distances, and radio telephone ground transmitters now cost from one-third to one-fourth more than ground telegraph equipment. If of equal power the radio telephone transmitter will have only about one-fourth the range, and more of them will therefore be required to provide constant communication along the route. Airport-to-airport traffic cannot be handled by radio telephone. When ground stations are licensed for point-to-point work the traffic must be handled only by telegraph, and therefore the transport companies that use a radio telegraph system and can obtain licenses for point-to-point work can effect enormous saving in land-line telegraph bills and rentals paid for leased lines. An extensive ground organization for maintenance of radio telephone sets on the planes will be required, and this organization need not be as large nor as highly trained if use is made of a complete radio telegraph system. Licensed radio operators can be held responsible for the maintenance of the simple type of equipment they use.

Rapid obsolescence of the plane equipment and its consequent replacement should also be considered. A fair estimate of the useful life of radio equipment on airplanes would be three years. The yearly write-off on radio telephone equipment can be considered as at least twice that of radio telegraph apparatus. At present price levels the yearly depreciation of each complete fifty-watt telephone transmitter on the above basis would be approximately $700. That of each comparable telegraph transmitter would not exceed $200.

The matter of communications in the aircraft field is fundamentally no different than in other well known mobile communication fields. Radio communication is a basic thing, and the primary requisites as suggested by years of intensive study in many other services can find an application in the aircraft field. When the subject has been completely analyzed it will be seen that the tried and proven methods can also be applied to air transport and no doubt they eventually will.

THE AIRPORT ON A *Paying Basis*

How Fairfax Airport, Kansas City, Was Planned and Developed to Make Possible a Maximum Return From the Investment

By JAMES P. WINES

PROFIT through each of the first 20 mo. of operation, in spite of large expenditures for improvements, is the claim of the management of Fairfax Airport, Kansas City, Kans. The field was taken over in October, 1928, by Woods Brothers Corporation, which is well-known in the Middle West for its river control work, and was operated first through Fairfax Airport Company, a subsidiary, and later through Fairfax Airports, Inc., in which the Woods Brothers firm retained a quarter interest.

Air view of Fairfax Airport, Aug. 4, 1929, when the field was formally dedicated

The financial success of Fairfax Airport is due in part, but by no means entirely, to the discovery of natural gas deposits on the property. Fourteen wells have been drilled and are now producing approximately 22,000,000,000 cu.ft. of gas a day. There is a mandatory ruling that gas must be used for heating the buildings and as fuel for the manufacturing plants both on the airport property and in the Fairfax industrial district, which bounds it to the west and south. Gas for these purposes is sold at retail at an average price of 34c. per 1,000 cu.ft., while the excess not utilized by the airport or the industrial district is sold to The Cities Service Gas Company at 18c. per 1,000 cu.ft. Aside from the profits realized by this management, it will be seen that the ruling governing the use of gas is advantageous in that there can be no smokestacks near enough the field to constitute a hazard for the planes operating from it.

Of course, it is not to be expected that the operators of airports everywhere will be able to find gas deposits on their property. In fact, it is rather unusual, although there are probably deposits of other types at some fields. The municipal airport at Long Beach, Calif., is in an oil producing area and might form an excellent oil field. Unlike gas, though, pumps are necessary to bring oil to the surface, while gas is forced up under its own pressure. At Fairfax Airport, the gas exerts a pressure of 185 lb. The wells are flush with the field and the gas is carried off in underground pipe lines, so that there is nothing to form an obstruction. The discovery of natural gas at the Fairfax field, though, and its use is cited simply to show how the management has utilized the by-products.

HANGAR and hangar site rentals, naturally, form a large part of the revenue that is obtained from the airport. The rents are computed according to a sliding scale, which takes into consideration the amount of space to be leased, the type of operations to be conducted, the length of the lease, and so on. Provisions are made also for increase in rent when the operations conducted by a

lessee increase beyond a specified point. At present, the base rate charged those operating from the field are from $2,000 to $10,000 annually. The majority of leases are for a period of 10 yr., although Curtiss-Wright Flying Service, Inc., holds a 20-yr. lease on a plot of ground 190x800 ft., which is now occupied by its two buildings, and Universal Aviation Corporation has its own building on a leased tract 190x400 ft. In all the leases, the management has agreed that no space will be rented at any time in the future for proportionally less money. The leases also contain renewal options with the proviso that increases in rentals upon the expiration of the present agreements may be submitted to a board or arbitration.

Monthly rentals of hangar space likewise bring the airport company revenue. The rates for storage in an unheated hangar vary from $30 to $75 per month, depending upon the square feet of wing area of the individual planes. For storage in a heated hangar, the rate is from $40 to $125. Transient planes are accommodated inside a hangar for $1.50, $2.00, $4.00, $6.00 or $7.50 as the case may be, while a charge for stake-down privileges varies from $1.00 to $3.00 a night. The stake-down price is doubtless set high to discourage the practice.

A large portion of the airport profits are also obtained from the sales of fuel and oil. Gasoline is purchased in tank car quantities and is stored in large tanks alongside the railroad siding to the west of the field. These tanks are connected with fueling kits in front of the hangars by 4-in. pipe lines. There is a profit of 7½c. on each gallon of fuel sold from the tanks, which affords a sizeable income when the operations conducted at the field are taken into consideration. Standard Oil Company (Indiana) and Independent Oil and Gas Company supply the tank car lots. In addition, each concern maintains a gas truck at the airport. Richfield Oil Company of California also keeps a truck here. The management, of course, receives its cut on all gasoline and oil sold from these trucks.

THE RESTAURANT at the field is a small one and is operated as a concession. A modern dining room, which will occupy the lower floor of one wing of the new administration building almost ready for use, is to be operated on a similar basis. Incidentally, the restaurant concession is almost a monopoly, since the land to a distance of three-quarters of a mile from the airport boundaries is controlled by Woods Brothers. As a result, there will be no competition with the restaurant on the field.

Western Union and Postal Telegraph offices will be housed in the administration building on a percentage arrangement; and the local Yellow Cab Company will pay for the privilege of maintaining a taxicab stand there. A cigar counter in the structure is to be operated by the airport management, just as the fuel and oil concessions have been retained solely as airport activities.

Another source of revenue lies in servicing. Mechanics are on duty at all times and will effect minor repairs on transient planes and those stored at the field. The profit from this work is not tremendous at the present time, but it is something that will become increasingly important. It may be that the airport will eventually maintain a complete aircraft and engine overhaul shop, although now, when extensive repairs on a plane are necessary, the work is turned over to one of the operators that is prepared to handle it.

The view of the field taken August 4, 1929, when it was officially dedicated, shows cars parked along both the western and southern boundaries. The crowd at the field that day was abnormal, of course, but the photograph shows the spaces used for parking. These spaces will be rearranged as the airport building program is carried forward. A 76-room hotel is to be erected diagonally across Fairfax Road from the administration building, and an extremely large space for automobiles is to be provided behind it, since all activities will center at that corner of the field.

It will be seen that officials of Fairfax Airports, Inc., have adopted or plan to adopt almost every known means for increasing the income of an aviation field. However, they do not intend to stop there. The company is maintaining several auxiliary fields to the north along the Missouri River.

One of these ports is at Weston, Mo., which is in a section largely devoted to the raising of tobacco. A flying school is planned for that field, and arrangements have been made to find part-time employment for the students in the tobacco fields as a means of aiding them to pay for their aviation instruction. Such a system will undoubtedly bring many pupils. In addition to that, the airport management will have some 60 acres of land available between the runways, and tobacco is to be planted there. It has also been suggested that the hangars be constructed to provide space for the drying of tobacco as well as for the storage of planes. The idea sounds weird, but knowing something of the operations of Woods Brothers, one can neither say that it is impossible nor improbable.

PERHAPS the most unusual item of revenue, however, will appear on the books of the Fairfax Field at Kansas City upon the opening of the administration building. Pay toilets have been installed in the structure and the management estimates that they will net the company $2,400 annually.

The river bottom area now occupied by the Fairfax port was first used as an air field shortly after the aviation meet held by the American Legion in 1921. The determination of the first persons to recognize the value of the property for that purpose, however, is more difficult. Some say that James M. Coburn was the first, that he made use of the land as a base of operations for passenger carrying and also for experiments which he conducted with his "Voice from the Sky" loudspeaker. Others assert that "Ben" Gregory was the first one to land a plane there. However, the prize for making the first forced landing evidently goes to "Tommy" O'Laughlin, since there seems to be no other claimants. Chester H. England, former garage owner and airplane mechanic of Kansas City, tells the story of how he furnished and installed a new propeller to replace the one that was damaged when O'Laughlin's plane nosed over after being forced down.

In any event, E. J. Sweeney, operator of a local automotive school, leased a 120-acre tract of land from Woods Brothers and opened a flying school in 1925. The field then became known as the Sweeney Airport. The natural flatness of the property and its proximity to Kansas City, Mo., of course, were governing factors in its choice as the location for the school. The present airport, an enlargement of the one started by Mr. Sweeney, is but 10 min. by motor car from Kansas City, Mo., and is practically within the limits of Kansas City, Kan.

The flying school project seemingly did not fare

particularly well, for the Sweeney Airport was taken over by Woods Brothers in October, 1928. To operate the field, Fairfax Airport Company, Inc., was formed with a capitalization of $100,000. Guy E. Stanley, vice-president and general manager of Woods Brothers Corporation, which is the holding company for the separate organizations conducting the varied Woods Brothers activities, became the head of the airport concern, and R. F. Craig, now the assistant manager of the Kansas City branch of Woods Brothers Corporation, was chosen to serve as vice-president and general manager. The present airport operating company, Fairfax Airports, Inc., is likewise headed by Mr. Stanley.

The Sweeney school had erected a sheet metal hangar to house the school planes and a small stucco club

The hangar of Curtiss-Wright Flying Service on Fairfax Airport. There is a salesroom on the lower floor

house for the use of the students. Both of these structures are still in use, although the hangar is to be moved to one of the auxiliary fields.

The first improvement made by the new management was the distribution of 230 carloads of cinders around the building and in front of the hangars. For this purpose, to pay the cost of erecting a new 80x120 ft. metal hangar, now used for transient planes and to cover the operating expenses for the ensuing year, the airport management requested the executive board of the company to set aside the sum of $40,000. This was done; but it is interesting to note, instead of $40,000, that the improvements made in the last 20 mo. have cost a total of $1,310,000 and the total expenditures including those of auxiliary fields will probably reach $3,000,000.

While the new hangar was in the course of construction, negotiations were in progress with officials of American Eagle Aircraft Corporation concerning the removal of its plant to a site to the west of the field. As a result of these negotiations, a new factory building for the airplane manufacturing concern was erected, and, in addition, the original Sweeney hangar was leased to Porterfield Flying School. Soon after that the first transport operations ever conducted at Fairfax Airport were inaugurated.

Mr. Craig, who was then the general manager of the field, tells the story of how he met "Dick" Pfennig, Kansas City operations manager of National Air Transport, Inc., on the street the afternoon of December 3. Mr. Pfennig, according to the story, told him that the Kansas City municipal field, then in the course of construction, was so soggy as the result of rainy weather that it was unsafe for the operations. Because of that situation, the N.A.T. planes were to land at the St. Joseph, Mo., airport that night and until the municipal field could be used again. St. Joseph is 64 miles from Kansas City and the mail of necessity would have to be trucked between the two cities. Then, Mr. Craig, says, he suggested the use of Fairfax Airport.

It will be remembered that the property on which Fairfax Airport is located and that surrounding it is river bottom land. The soil is alluvial and was formed by the action of the Missouri River over a long period of time. It consists first of a stratum of coarse sand, one of fine sand, and, finally, a 24-in. layer of dirt which was deposited over the entire area at the time of the 1903 flood. The point is that the field was comparatively dry, because of the natural drainage system provided by the composition of the soil. However, there were several objections to its use in night flying operations. There was a low spot in the center of the field and a hole had been dynamited to drain off the water that had collected. There were also some trees at the northwest corner. The chief objection to the use of the Fairfax field by the N.A.T. planes, though, was that it was unlighted. But all of these difficulties were done away with before nightfall.

Obtaining Mr. Pfennig's approval and his aid, Woods Brothers' engineers were set to work. Forty-eight construction "smoke pots" were laid out at 200-ft. intervals around the field to serve as border lights. A number of floodlights were secured, and hooked up temporarily to illuminate the airport buildings. To indicate the wind direction, ordinary electric light bulbs, dipped in green paint, were screwed into sockets mounted on boxes containing large storage batteries. Three of these makeshift lights were used, and instructions were issued to pilots to fly over two of them and land toward one. The trees at the northwest corner of the field were cut down; the hole was filled in; and that night and every night until June 15 the mail was brought into Fairfax Airport.

THE TEMPORARY acquisition of National Air Transport as an operator revealed the possibilities of Fairfax Airport and added impetus to its development under the management of Woods Brothers. It was decided that the size of the field would be enlarged immediately to cover the entire 234-acre tract bordered by Funston and Fairfax Roads and the 15-ft. sand levee, which had been constructed along the river to prevent the possibility of the land being inundated at high water. It was further decided to incorporate what had been Goose Island in the port as soon as possible. The island was in the bight of the river, and was separated from the mainland by a natural cut-off channel

This cut-off was just a few feet lower than the land on either side, and the river flowed through it only at flood time. Knowing the action of the river would fill it in a comparatively short space of time, if properly encouraged, Woods Brothers Construction Company installed a complete line of its river control work to catch the particles of soil carried into the channel during the high water stages. The channel is still too low by about three feet, but the high water this month (June) is expected to bring it up to the proper level, when the present levee can be dragged off and a new one constructed to protect the island and the channel. That will bring the total airport acreage up to 779.5.

Plans for the improvement of Fairfax Airport were made accordingly with a determination to include Goose Island and the channel as a part of it. It was decided that brick hangars would be placed along the west side of the field in line with the sheet metal structures and that an administration building would be constructed at the southwest corner. When the building program at

that side of the field was completed, the plans called for an extension of Funston Road to the dike, which has been done, and the erection of buildings along the southern boundary. An extensive landscaping program was evolved; the runways were plotted out; and a lighting system was designed. A drainage system, at first considered unnecessary, was later incorporated in the plans for the development of the port.

THE FIRST STEP in the improvement of the field, of course, was the preparation of the remainder of the land inside the present levee for aircraft use. The surface was level enough for most purposes, but not sufficiently so to allow planes to land and take off without involving some hazard. As a result the ground to the north of the 120-acre field was graded, a small job as seen by the fact that the deepest cut was one foot. The land to the south, on the other hand, needed only rolling. It had been used to a certain extent for farming and was in excellent condition. This work was followed by the carrying out of the development program in so far as the 234 acres that had been opened up were concerned.

In the meantime, the airport management went out for more business. Porterfield Flying School had already taken one of the sheet metal hangars on the field, while American Eagle Aircraft Corporation had opened a new factory on the other side of Fairfax Road. Curtiss Flying Service was the next to sign up for space on the airport, and was followed shortly by Universal Aviation Corporation. Rearwin Airplanes, Inc., manufacturers of the Ken-Royce line and Inland Aviation Company, which is now producing the Inland sport, have also taken space. These two firms have moved into a factory building, erected to the south of the new administration building at the junction of Fairfax and Funston Roads. Universal Air Lines and Southern Air Transport are using the port as a Kansas City base for their operations, and other transport and mail lines are negotiating for use of the field. There are, of course, a number of aerial service operators on the field.

Besides the small restaurant and the two metal hangars, there are now five other buildings on the airport, excluding the factories which are in reality in the Fairfax industrial district. Two of the structures are the Curtiss buildings, and were erected by the flying service following the approval by the airport architectural committee of the plans presented. While of course they are not quite the same in every architectural detail as those designed by the airport architects, the buildings are in keeping with the others on the field. The same thing is true of the hangar used by Universal Aviation Corporation.

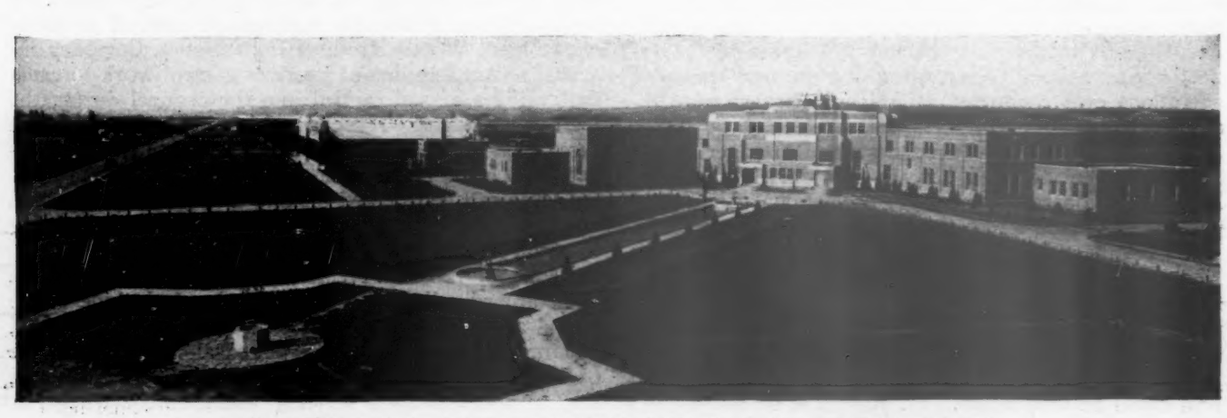
The Curtiss structures are of the same size, measuring 100x120 ft. Each is primarily for the storage of planes used in aerial photography, student instruction, mapping and charter work. In addition, the north one houses a repair depot and some of the ground school classrooms, while the south hangar houses more classrooms, offices of the local Curtiss-Wright organization and a salesroom. The building occupied by Universal Aviation Corporation is 135x172 ft. This hangar has a 2-story addition along the south wall, and houses a passenger terminal, offices for officials of the concern, quarters for pilots, student classrooms and a complete aircraft overhaul shop. An engine overhaul shop is maintained in a brick lean-to.

The fourth building at the field is what is known locally as the "sales hangar." This unit is in reality two brick and steel hangars, each 100x100 ft. There are lean-to's at both ends that house separate heating units and 14x14 ft. offices. The two sections are commercial hangars.

The new administration building, the fifth structure, will be ready for occupancy this month (June). When it is opened Fairfax Airport will have one of the best air passenger terminals in existence, as well as one of the finest revenue-producing propositions. From the latter angle, the dining room is perhaps of the greatest importance. It will seat 252 persons. There will be a wooden dance floor in the center and music will be provided by an orchestra seated on a balcony at one end of the room.

In addition to the dining room, the first floor of the administration building will contain the kitchen, a checkroom, women's rest room, a ticket office where tickets on all lines operating from the field will be sold, a waiting room, cigar and news stand, soda fountain, telegraph offices, telephone booths, a barber shop, smoking room, men's rest room, a suite of offices for the field flight surgeon, a mail room, an express room and a dock for loading and unloading mail and express. The second floor will be occupied by the offices of the companies operating from the field. The airport manager's office will be at the front of the building, and is to be surmounted by a control tower from which the lights will be controlled and the public address system operated.

Several months were devoted to study before any decision was made as to the type of runways that would be constructed at Fairfax Airport. The landing strip at Grand Central Air Terminal, Glendale, Calif., in the eyes of the Fairfax management seemed to present many advantages, but it was decided to conduct an experiment with an area treated in somewhat the same manner before a final decision was rendered. As a result, a plot of



The artistically laid out approach to the administration building at Fairfax Airport

ground 200x200 ft. was set aside for that purpose early in the summer of 1929.

The soil was first plowed and then worked over with a scarifier until it had been pulverized to a depth of about 12 in. Then cold asphalt in liquid form was applied until the soil had been thoroughly penetrated. This required from 16 to 20 applications, depending upon the composition of the ground. About ½ gal. per sq.yd. was applied at a time, so it will be seen that each square yard took from eight to ten gallons of asphalt. After each application, the soil was disced; and, following the last asphalt application, the area was rolled with a 20-ton roller. All pilots using the field were then asked to land their planes on the 200-ft. square. The resilient surface withstood the harsh treatment exceptionally well. Because of this and the facts that the surface turns water and will not freeze, the present runways have been prepared in identically the same manner as the smaller plot of ground. The extensions to be constructed when Goose Island and the channel become a part of the port will likewise be the same.

CONSTRUCTION of the drainage system has been completed. The field is drained off toward the southeast and under the dike at that corner. There is a natural slope in that direction. As a safety precaution, a pump house has been erected at the place where the mains run under the levee, so that the water may be pumped over it at high water. Through this arrangement, there is no danger of the water backing up in the system. Incidentally, concrete pipe is being used for the drainage system, instead of the more customary tile or iron piping.

The landscaping of the ground about the hangars has also been completed. Seventy-five thousand plants and shrubs have been planted by the landscaping division of Woods Brothers Corporation, and the airport is a veritable garden spot with its privet hedges, oriental arbor vitæ, tulips and baby rambler roses.

The square formed by the two wings of the administration building and the junction of Fairfax and Funston Roads is particularly attractive. In addition to the flowers and shrubs, there is a mirror pool which is stocked with goldfish. At either end are fountains, adaptations of a well-known European work of art. Toward the road, in back of the pool, is a beautifully designed drinking fountain; and to add the finishing touch, flagstone and gravel walks have been constructed. It should be mentioned also, in speaking of the landscaping, that a mixture of blue grass and white clover is to be sown between the runways on the field itself.

The entire landscaping plan was devised to present an attractive appearance from both the ground and the air, but attractiveness was not the sole object. Officials of Woods Brothers felt that there was something of more importance. They felt that by making the airport as beautiful as possible, added confidence would be inspired in the prospective air traveler. In other words, the gardening was done in an effort to link air travel as far as possible with the things people have known for generations. The management believes that the landscaping of Fairfax Airport has had the desired effect on the public.

Carrying out the landscaping idea, special attention has been given to some of the lighting fixtures at port. Take the building floodlights, for example. Instead of the usual variety, batteries of two and four General Electric floodlights have been mounted on arms extending from the uprights of well-designed street lamps. The lamp posts were manufactured by the Union Metal Manufacturing Company, Canton, Ohio, and are the latest thing in street lighting equipment. Floodlights have also been sunken in the masonry at the corner of one of the hangars giving another indication of the trend.

On the other hand, no attempt has been made to disguise much of the lighting equipment. The three field floods, one of them of the 5 kw. and the other two of the 10 kw. type, are mounted separately on metal standards inside wire fence enclosures. Two more of the 10 kw. variety are to be added. One will be placed at the south and the other at the east side of the field. In carrying out the field beautification program, the management of Fairfax Airport might do well to follow the example set by the officials of the Curtiss-Chicago Airport in the mounting of the main floodlight for that field. It will be remembered that the 15,000,000,000 cp. light is housed in a small brick building that is in keeping of the design of the hangar unit and is very attractive. Semi-circular doors cover the lens of the light when it is not in operation, avoiding the necessity of using fencing to keep the curious public away. Similar structures for the smaller lights in use at Fairfax and other fields could be employed to advantage.

The appearance of the other lights ordinarily used at an airport is not of particular importance. The cone boundary lights, such as those in use at the Fairfax field, are constructed to serve best the purpose for which they are intended. It is doubtful if their appearance could be improved upon without some sacrifice in both efficiency and safety. Moreover, boundary lights are usually so far from the spectators that beauty is a minor consideration. The 8,000,000 cp. beacon at Fairfax Airport with the zenith light and the course lights which flash the letters "FAX" are mounted out of the way on the roof of the sales hangar. There is a ceiling projector, also, and a spot searchlight near the administration building. Crouse-Hinds border lights are mounted 150 ft. apart along the edges of the runways, and the port has an automatic wind tee that turns on the green runway markers according to the direction of the wind. In this connection, it might be added that some of the lighting equipment is of B3T manufacture. Additional lighting equipment in the form of Sperry 180 deg. dioptric floodlights is being installed.

SOME MENTION has already been made of the Fairfax auxiliary port at Weston, Mo. In addition to this, Fairfax Airports, Inc., is maintaining three other auxiliary fields. One of these is the 205-acre Rosecrans Field at St. Joseph, Mo. The second is known as the Atchison Airport, although it is near Sugar Lake, across the river from Atchison, Kans. This field covers 160 acres. The third is the 226-acre Parkville Port near Parkville, Mo. A shelter is the only structure on that field, since it is just across the river and a little to the west of Fairfax Airport. The reason for the establishment of this auxiliary port was to provide a suitable field for student instruction as a means of preventing congestion at Fairfax Airport. This field and the other auxiliary fields provide emergency landing areas for transport planes should the pilots encounter bad weather conditions at Kansas City. But all of these things are simply added indications of the manner in which Woods Brothers are entering the aircraft industry. The organization has met with success in other lines of endeavor, and, from its record up to date and its plans for the future, it looks as though the airport business would soon be added to the list.

HOW *Aviation* LOOKS TO *Us*

The Reason for the Cord Corporation's Entry Into the Industry, and the Manufacturing and Merchandising Policies

E. L. Cord, president of the Cord Corporation

By L. B. MANNING
Vice-President, Cord Corporation

TO US flying is transportation. It is a method of getting from here to there. The public has always sought an improved method. The ox cart, the sail, the stage coach were discarded for the liner, the locomotive, the automobile and now the airplane.

It is a recorded fact that those forms of transportation have made enormous strides which have offered the public additional time saving, comfort, and safety at a cost that has made their use accessible to a large body of the public. In entering the field of aviation the Cord Corporation has kept these factors uppermost and our entire aviation program revolves around their development as applied to the airplane.

Marked progress in any industry depends on wide acceptance. It is our belief that if the public is to enjoy the full benefits of aviation, planes must be produced and sold in ever-increasing volume, at the same time maintaining ever higher standards of engineering, design, and production.

Before any great volume is possible, complete and finished planes must be produced at prices that will place them within the reach of a greater number of buyers. Previous to our entrance into aviation precedent had been to build planes, engines and accessories as individual units and these in limited quantities. Hence unit prices were unduly high, and finished products were selling at a figure which at once made them prohibitive to the general public.

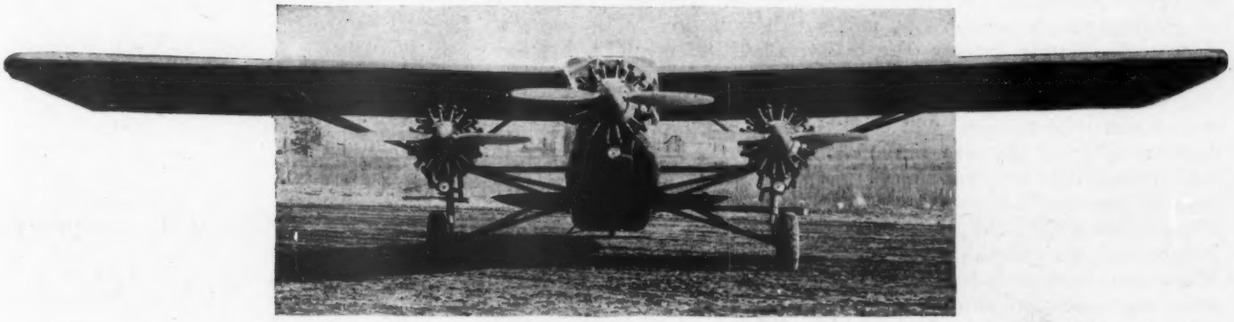
Perhaps at that time those prices were justified. The building of planes is entirely different from that of any other kind of vehicular production. The highly trained technical organization needed, the fine workmanship spent on engines and planes, the extremely high cost of highly alloyed materials bought in small quantities did not enable manufacturers to quote lower prices without loss. Not until some manufacturer was in a position to introduce new methods of buying, production, management, and merchandising, could any material progress be made.

Our surveys of the aviation field showed us that a considerable part of the cost of an airplane was in the engine and in our opinion these prices have been excessive. With our vast resources in buying, experience in production methods and large and diversified engineering staffs, we felt we were in a position materially to reduce engine costs and provide even better power plants than had heretofore been available to airplane builders. Hence we decided to enter the aircraft industry through our Lycoming engine plant at Williamsport, Pa. This company was then producing at the rate of 70,000 passenger car, truck, and marine engines annually, and aviation engines could be added to the list with but little additional overhead. Two and one-half years ago we built our first experimental aircraft engines.

WE WANTED to produce a quality product throughout, one that would be comparatively free from operating troubles and have a longer life than other power plants on the market. We also decided at the outset that the engine should be equipped with an electric starter which would at once eliminate the cause of many accidents and add to the ease of operation.

Inquiries concerning accessories from various parts manufacturers soon revealed one reason why aircraft engines were so costly. The word "aircraft," it seems, when associated with any product, for no apparent reason, magically increases its value. We had many striking experiences with that sort of thing. For instance, we discovered that a certain small part which we had been using in our regular Lycoming engines was identical in size, shape, threading and material with one used in our aircraft engines. This part cost us 17 cents for the automobile engine, whereas it was quoted by aircraft purveyors at four dollars.

Likewise, when we found that certain types of other important parts and accessories used on engines comparable to the one we planned to manufacture were excessively overpriced, we entered into negotiations with various makers who cooperated in the development of new and better equipment. By purchasing this equip-

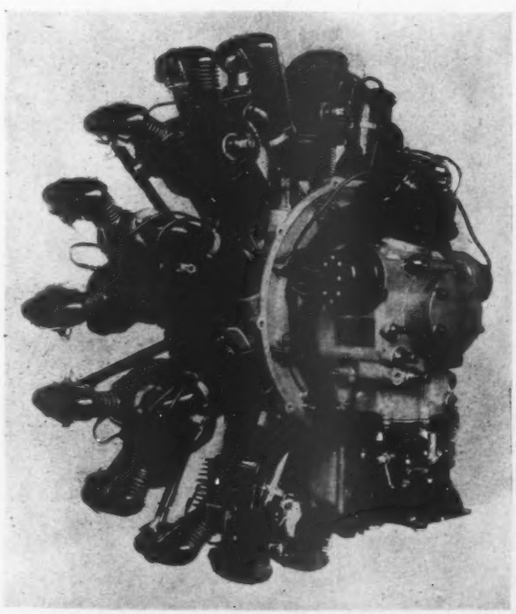


Front view of the new Stinson, ten passenger, "Airliner" powered with three 210-hp. Lycoming engines

ment in comparatively large quantities we were able to obtain many parts at figures more nearly proportionate to what they would cost for other types of internal combustion engines which, of course, reduced the total manufacturing costs.

In getting ready for this aircraft engine program we first drew into our organization the best aircraft engineers available as the nucleus for a separate engineering staff. Then all types of aircraft engines were thoroughly studied. In a little less than a year we had produced our present nine-cylinder Lycoming radial aircraft engine. While this engine was ready to announce and was actually displayed to the public a year ago, we withheld placing it on the market until it had undergone further exhaustive and crucial tests in various types of planes by our own experimental department. We preferred to do our own development work rather than leave it to the public.

Through our experience in buying in the automobile field, our heavy commitments, and connections with parts sources, and through our installation of the most modern machinery we were able materially to reduce the costs of engine production and still provide a greatly superior product.



Rear quarter view of the 210-hp. Lycoming engine

It was at once apparent that if prices on completed planes were to be reduced materially the plane must be built and sold as a unit. By that I mean that it would have to be a standardized product just as an automobile is standardized. The buying public, if it was to pay less for its planes, would have to buy models antl not individually made planes, any more than it could buy a Packard car with a Lycoming engine, or an Auburn with a Buick power plant. To meet the various needs of the public different models would have to be offered that would do a particular job.

FOR THIS REASON we did not advertise a price on the Lycoming engine at the St. Louis Show, although there was considerable comment because of this. But neither is there an advertised price on an automobile engine. It is Mr. Cord's belief that the public, once it has the opportunity, will come to think of planes as units, rather than as of flying machines made up of various parts.

Then we looked about for a plane manufacturer who was in a position to carry out the policies which we advocated—that of producing a safe, reliable cabin plane at the price of a fine motor car. We felt that based on present production of any existing companies, such a price would be wholly unwarranted and unjustified. The company which built such a plane would have to be in a financial position and have such confidence in the future of aviation that it would be willing to invest present profits in the belief that airplanes would be bought in sufficient quantities eventually to reimburse for the pioneering. When that time came there would be substantial profit.

E. L. Cord, president of the Cord Corporation, and myself, as well, had been flying Stinson planes for nearly two years in our business. I had flown my own Stinson more than 700 hours and had found it to be a thoroughly safe and reliable craft. The Cord Corporation acquired control of the Stinson organization Nov. 1, 1929, and at the St. Louis Aircraft Show, we announced the four-place Stinson Junior Cabin plane, powered with a 210-hp. Lycoming engine, at a retail price of $5,775. There were no extras.

The setting of the $5,775 figure on the Stinson Junior was not an attempt on our part to start a price war in the

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industry. It was the first step in our aviation program of making planes available at prices that will greatly enlarge the buying public. We believe that the entire industry will benefit.

In the actual production of Stinson planes we found that similar type savings could be effected as in the production of the Lycoming engine. The Wayne plant was completely overhauled, new machinery added, straight production lines installed and other economies effected throughout the plant. Parts and materials were bought in large quantities by trained buyers at a price. Many parts heretofore made by hand were now stamped and wings assembled in new type production jigs. Lost motion was eliminated in this assembly with actual production costs in some instances reduced 300 per cent.

AN EXAMPLE of this is that under our present system of production workmen become experts on the one job they do. Under the previous system of building airplanes most of the men were so-called "Jack of all trades." That is, a welder might help assemble, run a buzz-saw or apply a coat of lacquer. Under the system we are now employing at Stinson not only does a welder only weld, but each welder has particular parts that he welds only. A man who works on a fuselage does not work on an engine mount, and more, he works only on certain parts of the fuselage. Thus day after day the same type piece is before him to weld, the same operations are required and the same results must be obtained.

The establishment of this method throughout the entire plant has resulted in increased uniformity and quality of workmanship and materials and giving the public a much superior product, at less cost.

We have been asked why we produce cabin planes exclusively. As previously noted one of the prime factors that leads to acceptance of a new kind of transportation is comfort. Unquestionably there is a field for the open cockpit plane, but in our opinion the greatest field lies in the closed one. When flying left the "stunt period" it left behind it the helmet and the goggles, the appurtenances of a "bird man." The man of business enters the cabin plane in the same clothes that he wears in his office, and he is surrounded by the same luxuries and comforts that he is accustomed to in his limousine. If he desires to fly the plane himself a seat is directly along side that of the pilot where he can operate the plane with the dual controls.

Moreover, we hold that it is easier to teach a man to fly in an inclosed plane than in an open one. The instructor and student sit side by side in the cabin machine. Demonstrations of actually what is done to operate the plane are more easy. They can converse, ask questions and the student can actually see the various movements. Besides that, he is not distracted by the propeller blast, heavy clothing and all the other things that go with flying in an open cockpit plane. At one time it was claimed that the only way to learn to drive an automobile was by having the top down and feeling the wind blow against your face.

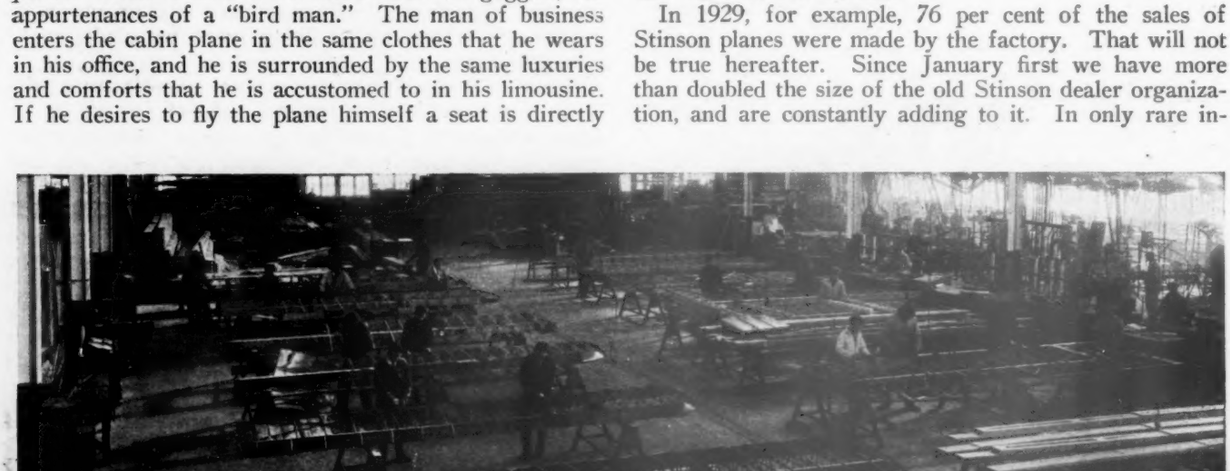
It is our belief that most business men who buy airplanes are not in a position to spend a great amount of time learning to fly. Rather, the tendency is to learn gradually as they fly with their pilots. This was the case with Mr. Cord.

Two years ago Mr. Cord bought a Stinson plane, hired a pilot and began his business trips by air. The first time he was up he took the dual wheel along side that of the pilot. He found that flying the plane was easy. There was no traffic, no cross roads and that the plane actually flew itself. On each one of his subsequent trips he flew the plane for a period and in about six months' time he had become a good flier. In this way he became proficient enough, and had enough hours in the air to obtain his license.

We will be constantly striving to improve the designs of our planes, but the changes that are made in any year's models will not be of a nature to render the present ones obsolete. This, we believe, is a protection for the buyer's investment and as this policy has been unusually successful for us in the automotive field we believe it will likewise be approved with regard to planes.

While there are certain general merchandising principles which we are applying, we are not employing automobile methods in the sale of airplanes. We believe that each field is distinct.

In 1929, for example, 76 per cent of the sales of Stinson planes were made by the factory. That will not be true hereafter. Since January first we have more than doubled the size of the old Stinson dealer organization, and are constantly adding to it. In only rare in-



A general view of the wing department of the Stinson aircraft factory

stances have we granted franchises to our automobile dealers in the United States; in fact, we are exerting every effort to discourage the practice. An automobile man who could sell perhaps three or four cars a week might spend the whole of that time in a vain effort to sell a plane to a prospect. As a consequence, both lines would suffer in the long run. The situation in the foreign market is somewhat different.

One of the outstanding innovations we have brought into the merchandising end is the super service factory branch. To date we have established three of these branches: Burbank, Calif.; Ft. Worth, Tex.; and Chicago, Ill., and plan for additional ones.

The purpose of these branches is to assist both the dealer and the public. As aviation expands, improved service to plane owners becomes imperative. Few dealers are at this time in a position to give complete service such as a factory can, yet it is impossible to adequately service the entire country from one point. In establishing these factory branches in strategic points of the country, owners of Stinson planes will be able to get factory type service within a short radius. Each one of these branches will carry on hand a full stock of parts and other airplane materials. Factory type machinery will be installed for servicing and factory trained men will make up the personnel. In addition to this, experts trained at the Lycoming plant will be placed at each one of these branches to service Lycoming engines, and similar experts familiar with the Wright and Pratt and Whitney engines which we also use, will be stationed at the branches.

THE ESTABLISHMENT of these factory branches will in no way affect our dealers, but will materially assist them in their service to the public. Only those service jobs which they themselves are not equipped to handle will be sent to the factory branch, and in addition time will be saved on their obtaining parts and materials.

One feature of these branches which is having a strong appeal to dealers is that a full line of Stinson planes will be carried at the branch. Dealers, unable to carry on hand more than one or two models, can fly their prospects to the nearest branch and there get a demonstration on whatever model is wanted. We plan, also, to ship planes knocked down to these branches in carload lots, there to be assembled and in this way again reduce the delivery cost of our planes to the public.

A new feature which we will pioneer within the next few months is that of setting flat rates for specific service jobs. Heretofore the owner of an airplane seldom had an idea of what a service job would cost him. Under this plan if the owner of one of our planes wants a top overhaul made on his engine, or any other work of a similar nature, he will know exactly what it is going to cost him. There will be a standard price list for parts and also standard discounts. The discount given the factory branch will be sufficient to defray the cost of handling the parts and dealers' discount will be enough to provide them with a profit.

The question of what we intend to do for our dealers is pertinent. I will answer that by saying that we believe that volume sales in airplanes can only be reached by a strong dealer organization.

In building up such an organization to begin with, we have given our dealers the greatest airplane value ever offered the public. We have given them a safe plane, that offers all the comforts and luxuries of the finest type of transportation, and we have given it to them at a price that is approximately 50 per cent less than any such plane has ever been available to the public before.

Next, he has a complete line ranging from the four-passenger to the ten-place Tri-motored Airliner Transport. In between these prices are six other models, with various types of power plants each designed for a specific purpose and each at a price far below comparable value.

IT IS our belief that the greater public acceptance of the airplane will come with the public becoming informed of how safe it is to fly, how easy and how comfortable. The first step is to present the facts to them and then let them get into the planes themselves. In this regard we have laid down a national advertising campaign which includes national magazines and the aviation trade papers.

Perhaps one of the most important dealer helps will be our national finance plan. Negotiations are now under way and we expect within a short time to be able to recommend to our dealers a plan that will materially assist them on plane installment selling.

While we believe that the greatest airplane market lies today in the direction of business, in planning our 1930 program we have endeavored to cover a widely diversified field in aviation.

In reply to the question of "men of what age offer the greatest market for planes?" I would say that we believe from 35 to 40 years. The reason for this is that at that age they are old enough to be earning sufficiently to consider the purchase of a plane and at the same time young enough to want to learn to fly. In all probability we will urge our dealers to concentrate on this market. However, this age is just a surmise. It was believed at one time that the older generation would never drive automobiles.

The buying of an airplane is in many ways similar to buying an automobile, radio or a motor boat. As to the question of "how to sell a plane" it would seem to me to be up to the individual salesman. He probably will catalogue his prospects just as a real estate, automobile or bond salesman does. Obviously if a man hasn't the money to buy a plane, or sufficient credit, the salesman would be wasting his time trying to sell him. If, however, he has interest in aviation and is in a position to buy but has some latent fear of his own, or of family, then a certain amount of salesmanship diplomacy would have to be used.

We do not feel that a salesman must primarily be a pilot. He should be able to fly and he must know the aviation industry thoroughly, but most of all he must be a salesman. If a pilot has these qualifications then he has a great advantage. If not, his success in selling planes will probabaly be limited.

One thing in addition we are impressing on our dealers is that they will have to be in a position to teach their customers to fly. Of course, neither we nor the public, expect them to do this without compensation, but the facilities must be available.

The reductions in plane costs to the public which we have effected have broadened the market many fold, but not sufficiently, to bring aviation to the point whereby it becomes one of America's great industries. This can only be accomplished when planes can be produced and sold at a price which will place them in the hands of the ordinary man.

We are looking forward to the not distant future when we will be able to produce a plane of even greater value than we are giving today at the cost of a medium priced automobile.

GENERAL NEWS

HERBERT F. POWELL, *News Editor*

Issue Regulations For Chutes, Gliders

Former Effective July 1; Three Glider License Classes

WASHINGTON (D. C.)—Regulations governing the approval of parachutes and the licensing of gliders have been announced by the Department of Commerce through Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. (Initial plans for the licensing of gliders and parachutes were given in the June 7th issue of AVIATION, p. 1142.)

The parachute requirements, designed to ascertain the strength of the material in a pack, its rate of descent, and its promptness and certainty in opening, will become effective July 1, 1930.

They are as follows:

Five tests, involving more than a score of drops from an airplane in flight, will be required of each parachute type submitted to the Department of Commerce for approval.

Must Open Within 3 Sec.

In the first test, promptness of opening must be proved by the parachute opening fully within 3 sec. after being dropped with a dummy weighing 170 lb. from a plane flying 70 m.p.h. and at an altitude of 500 ft. Twelve such drops will be made.

The second test will be conducted under the same conditions with the exception that the suspension lines will be twisted and the parachute must open fully within 4½ sec. with all twists removed. Five such drops shall be made.

The third test to determine the strength of the parachute will involve three drops with a 600 lb. weight from a plane flying 100 m.p.h., and at an altitude of not more than 500 ft.

Two live drops, to be made with a 170 lb. man from an altitude of 2,000 ft., will constitute the fourth test.

Repacking Required Once in 60 Days

The last test, to determine the rate of descent which shall not exceed 21 f.p.s., will be accomplished by dropping a parachute from an altitude of 2,500 ft. with a 170 lb. dummy.

The new regulations require that parachutes approved by the Department of Commerce shall be packed or repacked at least once in each 60 days before being worn in flights.

The examination and certification of parachute types will be undertaken by the Department only upon application by the manufacturer for an approved type certificate.

The parachute is eligible for approval, also, if it has been accepted by the Army or Navy.

In drawing up a code for the licensing of gliders, the Department of Commerce states that gliders falling into the following three classes will be eligible for licenses and will be issued such upon passing an inspection:

1. (a) Gliders manufactured under Approved Type Certificates. This corresponds to the present procedure involving the licensing of airplanes which are built under Approved Type Certificates.

(b) Gliders constructed by any one, provided they are built in accordance with specifications and designs which have been previously approved by the Department of Commerce.

2. Gliders not manufactured under Approved Type Certificates but which meet the requirements for such a certificate (similar to Group 2A airplanes.)

3. Gliders not included in either class 1 or 2 will be eligible for license provided they pass a visual inspection by the Department of Commerce as to design, materials, workmanship, and flight characteristics, and provided they are manufactured prior to October 1, 1930.

Gliders under Class 1 (a) are those manufactured in quantities by holders of Approved Type Certificates for the type of gliders they are building. Such gliders shall be exactly similar in specifications, design, and workmanship to the type approved by the Department.

Class 3 Licensed Until October 1

Gliders under Class 1 (b) are those manufactured by private owners or others who have followed previously approved specifications and design, such as gliders manufactured from the drawings of an approved type glider, provided, of course, the holder of the Approved Type Certificate sees fit to distribute such drawings.

Gliders manufactured under Class 2 are those which meet all of the minimum requirements for an Approved Type Certificate, but for which a Certificate is not desired because quantity production is not planned.

Gliders under Class 3, include those built by individuals and clubs with or without previously approved designs, provided they have been manufactured prior to October 1, 1930. Gliders so constructed after October 1 will not be considered eligible for license.

Hold Air Meet at Westfield, N. J.

ROSELLE (N. J.)—Aviators Post No. 743 of the American Legion, New York, and Unity Post No. 229, of this city, sponsored an air meet at Westfield (N. J.) airport June 14-15. Included in the events were a model airplane contest, parachute jumps, etc. The airport was made available through the cooperation of Atlantic Air Services, Inc.

Purchasing Agents Suggest Aero Services

CHICAGO (ILL.)—Proposals for the establishment of means for compiling and disseminating reports and findings of scientific and engineering groups and of technical and purchasing groups within the aviation industry were voiced at the recent annual convention here of the National Association of Purchasing Agents.

The scientific and engineering clearing house was proposed by E. Van Vechten of National Air Transport. The services of Southern Air Transport were offered by J. S. Beauchamp, of Fort Worth, as a clearing house for information regarding supplies and specifications.

It was suggested by Beauchamp that mimeographed data sheets be sent to all manufacturing companies concerning materials, their source, service of vendor, etc. This information, plus such items as new discoveries, would be posted on a master sheet for distribution to the industry.

Detroit Bureau Re-elects Officers

DETROIT (MICH.) — Edward S. Evans, president of the Detroit Aircraft Corp., was re-elected president of the Aircraft Bureau, Detroit Board of Commerce, at the bureau's annual election held here recently. Three vice-presidents, William B. Mayo, Frank W. Blair, and William E. Metzger, also were re-elected, as was the manager, Ray Cooper. Four new names were added to the Bureau's Executive Committee. They were William B. Stout, president of Stout Air Services, Inc.; Maj. Floyd E. Evans, commanding officer of the 107 Observation Squadron, Michigan National Guard; Maj. Sid A. Erwin and Arlo A. Emery, attorneys. The Aircraft Bureau was created more than a year ago to handle aircraft events sponsored by the Detroit Board of Commerce and now has 90 members.

Diesel Fuel Tax Carries Refund

OLYMPIA (WASH.)—The regular gasoline tax must be paid on fuel oil purchased for use in the Packard Diesel type engines in the State of Washington, according to a statement by Assistant Attorney General Parker rendered in a decision to the Director of Licenses. However, if the product is not used to move motor vehicles over public highways, a refund will be available under the exemption provision of the statute. The tax is originally levied according to the law requiring an excise of cents per gallon to be paid by distributors of "liquid fuel" within the state.

Authorities Discuss System of Plane Credit

WASHINGTON (D. C.)—The possibility of establishing a system of credit for aircraft purchases by international agreement was discussed by subcommittees of the international technical committee of legal experts on aviation at a meeting held in Paris a short time ago. In September the question will be considered by the full commission at its meeting to be held in Budapest, Hungary. W. L. Finger, automotive trade commissioner to Europe, has informed the Department of Commerce.

The full text of his statement follows:

Representatives of 29 states were included in the four subcommittees. Among the subjects discussed were: An international agreement on the conditions of ownership of a plane, on an aeronautical register, on the hypothecation of planes, and on air privileges.

The object of such an agreement is the establishment of a system of credit for airplane purchases, which would guarantee the rights of both purchaser and creditor.

The committees also considered the draft of an agreement regarding responsibility for damage to persons or property on the ground, which would supplement the proposal made at the Warsaw meeting of the judicial experts on aviation last year relative to the responsibility of the air carrier regarding passengers and merchandise transported.

A project for defining the legal position of the commander of an airplane and of his staff was also studied by the committees. No decision was reached on any of these points.

Kinner Stockholders Elect

GLENDALE (CALIF.)—At the annual meeting of Kinner Airplane & Motor Corp. stockholders the following directors were elected: W. B. Kinner, Robert Porter, Preston Lockwood, Roy D. Bayly, B. L. Graves, E. L. Stanton, W. Wardman. Officers chosen for the firm were Robert Porter, president; W. Wardman, secretary and treasurer; Roy D. Bayly, first vice-president; and B. L. Graves, second vice-president. Production has been started in the Kinner factory on the new Kinner B-5 125 hp. engine. The new engine is a development of the K-5 engine and, in makeup, is an almost exact duplicate of the K-5 except for the increased size and can be built with but slight investment in additional jigs and fixtures. Many parts of the two engines will be interchangeable as a service feature.

Further Postpone R-100 Trip

NEW YORK (N. Y.)—According to word received here the trans-Atlantic flight of the R-100 to Canada has now been postponed until sometime after July 28, the date of a British election.

Pacific Show Starts June 28

OAKLAND (CALIF.)—The first Pacific Coast Aeronautical Exposition will be held June 28 to July 6, at the Oakland Municipal Airport. Sanctioned by the Aeronautical Chamber of Commerce and the Chamber of Commerce of Oakland, the show is being sponsored by the Oakland post of the American Legion, and the Aero Club of Northern California, a chapter of the N.A.A.

B-J Approves Merger With North American

BALTIMORE (MD.)—The offer of North American Aviation, Inc., for acquisition of the Berliner-Joyce Aircraft Corp., has been approved by the board of directors of the latter company and will be submitted to the stockholders at a special meeting to be held June 23.

The plan involves the formation of a new corporation and the exchange of Berliner-Joyce Class A stock share for share for Class A stock of the new company. Furthermore, holders of Berliner-Joyce stock will receive an option to convert their new stock on a basis of two shares for one of North American.

There are approximately 38,000 shares of Berliner-Joyce stock outstanding. An additional 44,000 shares will be issued by the new concern for $300,000, and further working capital up to $250,000 will be provided when and if necessary during the company year.

There is no indication that major changes in the internal organization of the Berliner-Joyce company will result from this change of financial structure.

North American Aviation, Inc., a holding company, owns considerable blocks of stock in many aircraft companies, and in addition, owns outright the Sperry Gyroscope Co., the Ford Instrument Co., and Eastern Air Transport, Inc.

Test Berliner-Joyce Fighter

WASHINGTON (D. C.)—The new Berliner-Joyce, single-seater, experimental fighting plane, XFJ-1, was flown for demonstration on June 10 at Bolling Field by Temple N. Joyce before representatives of the Naval Bureau of Aeronautics. The craft is of monocoque construction, tapering from a maximum cross section of about 4 ft. x 3½ ft., and is powered with a 450-hp. Wasp. The top wing is flush with the pilot's eye to give improved vision. Approximately 22 ft. over all, the machine has a top wing spread of 30 ft., and is equipped for carrier landing, with emergency flotation gears and brakes.

Air Meet Held at Pratt, Kan.

KANSAS CITY (MO.)—Several thousand spectators attended the air meet held at Pratt, Kan., on June 8, in which 37 planes participated.

HIGH POINTS in the NEWS

▶ *Requirements.* Aero Branch issues regulations covering parachute approvals and glider licensing, the former to become effective July 1.

▶ *To consolidate.* Directors of Berliner-Joyce approve acquisition of company by North American Aviation on a share exchange basis.

▶ *Army orders.* Air Corps contracts with five manufacturers for 402 planes and 128 engines worth a total of $5,963,419.38.

▶ *Legal aspects.* Northwestern University will offer a course in air laws, August 6-19, to be presented by American and foreign authorities.

▶ *Chicago.* Executive officials for National Air Races announced by Maj. R. W. Schroeder, contest chairman.

▶ *Altered.* New Standard reduces prices of two-place training and five-place passenger planes; starts new sales policy.

▶ *Changed.* Two towns dropped from second Nebraska air tour which will now be held from June 23-28.

Airports and Airlines

▶ *Up.* T.A.T.-Maddux, American Airways, and Southwest Air Fast Express increase rates from about $.05½ per mile to $.07 per mile.

▶ *Air Mail.* Operators submit modified map of mail routes to Postmaster General Brown. Speculations surround project.

Issue Mechanic Training Data

WASHINGTON (D.C.) — Information having to do with the training for airplane mechanics and aircraft engine mechanics is contained in Bulletin No. 142 recently issued by the Federal Board for Vocational Education. With the aid of the Aeronautics Branch and the Naval Aircraft Factory, Philadelphia, data on, and suggestions as to the teaching of, those two trades is offered. Copies of the pamphlet may be had from the Superintendent of Documents, Washington, D. C., for ten cents each.

Canadian Boeings Designated

VANCOUVER (B. C.) — "Thunderbird" has been the name trademarked for all Boeing planes built in Canada, while the 40-B4 Hornet-powered mail and passenger craft being manufactured here have been redesignated 40-H4's. Several changes are made in the 40-H4's—the first unit of which was recently completed at the Boeing Aircraft of Canada factory here—for adapting them to Dominion conditions.

Northwestern to Offer U. S., Foreign Air Law Talks

EVANSTON (ILL.)—A group of lectures on international air laws, said to be the first course of its kind ever given, will be offered this summer at the Air Law Institute of Northwestern University, August 6-19.

In connection with this feature, to be participated in by authorities from England, France, Italy, Latin-America, and the United States, the National Legislative Air Conference will hold a three-day meeting, from August 18-21, in Levy Mayor Hall of the University, where the lecture classes will also convene.

Following the addresses, which are to be delivered from two to six in the afternoon and eight to nine-thirty at night, every day except Saturday, there will be an opportunity to discuss air law problems.

Both the lecture course and the deliberations of the National Legislative Air Conference will be covered by a $50 fee, states director Fred D. Fagg, Jr. Approximately fifty discourses, touching on all legal aspects of aviation, are scheduled for the following courses:

Various Speakers Named

American Aviation Law: George B. Logan, chairman of the legislative committee of the St. Louis Air Board and lecturer in the school of law of Washington University. Also a member of the advisory board of the Air Law Institute.

American Radio Law: Louis G. Caldwell, chairman of the American Bar Association committee on radio law and formerly general counsel for the Federal Radio Commission.

British Air Law: Dr. Arnold D. McNair, fellow and senior tutor of Gonville and Caius College and lecturer in law, University of Cambridge.

French and International Air Law: M. Albert Roper, secretary general of the International Commission of Air Law, Paris.

Italian Air Law: Prof. Antonio Ambrosini, director of the International Commission of Air Law, Rome.

Latin-American Air Law: Dr. Pablo Carrerra Justiz, vice-president of the Curtiss Cuban Aviation Co., Havana.

Seminar on Air Law Teaching Courses: Prof. Carl Zollman, lecturer on air law in the school of law at Marquette University, Milwaukee, and a member of the advisory board of the Air Law Institute.

Eaglerocks to Forestry Service

LOS ANGELES (CALIF.)—Three J5 Eaglerocks have been contracted for by the U. S. Forestry Service with the Aero Corporation of California to be used for summer patrol work over the Angelus, Cleveland, Santa Barbara, and San Bernardino National Forests in Southern California.

Data on Air-Minded Los Angeles County

LOS ANGELES (CALIF.)—A. W. Poole, manager of the Los Angeles Chamber of Commerce aviation department, who recently completed a survey of aero activities in Los Angeles County, announces that that district has the following:

Fifty-seven airports or landing fields in regular use, eighteen airplane manufacturers, eleven airplane engine manufacturers, 52 of the 200 licensed women pilots in the country, 25 aviation schools with approximately 1,500 students in attendance, 49 airplane distributors or dealers, nineteen scheduled daily air services offered by six transport companies, eighteen glider clubs with ten or more members each, four air-rail terminals, and two air mail terminals; while he stated there was a production of more than $5,500,000 worth of airplanes and airplane engines there during 1929.

New Standard Revises Prices and Sales Policy

PATERSON (N.J.)—Considerable reductions have been announced in the prices of planes built by New Standard Aircraft Corp. The company's two-passenger training plane, Kinner-powered, now sells for $3,131, as compared with the former price of $4,475.

The five-place open biplane, with 225 hp. Whirlwind engine, has been reduced from $9,750 to $7,990. The New Standard sport plane, also using Kinner engine, will sell at $5,100 as before, but a larger dealer's discount is offered.

Together with the statement of new prices, the company has announced a change in sales policy. There will be no more distributors, and no exclusive territory will be assigned to dealers.

Registered owners of New Standard planes will receive a small commission for selling additional machines, but prices on first purchases are net. The announcement states that this new policy has been introduced because over 90 per cent of New Standard sales have been made directly to commercial operators.

Approve Pennsylvania School

WASHINGTON (D. C.)—An approved school certificate was granted recently to the Altoona Aircraft Corp., Stultz Field, Tyrone, Pa., for Private and Limited Commercial courses—ground and flying.

Alter Dates and Route Of Second Nebraska Tour

LINCOLN (NEB.)—The committee in charge of arrangements for the second annual Nebraska air tour have definitely decided to make the tour a six rather than a seven-day affair as announced earlier. It will start from Lincoln June 23 and end at Omaha June 28. Two towns, Fremont and Falls City, have been dropped from the previously arranged tour schedule, because their airports are too small to accommodate the 35 or 40 planes expected to participate.

Fifteen stops are called for at towns so situated that the entire state will be covered by the fliers. The amended itinerary follows: Monday, June 23—leave Lincoln, arrive at Niobrara for lunch, spend the night at Norfolk; Tuesday — Long Pine, Valentine for lunch, spend the night at Hay Springs; Wednesday—Alliance for lunch, night at Scottsbluff; Thursday—Sydney for lunch, night at Ogallala; Friday—Lexington, Kearney for lunch, Holdrege, night at Grand Island; June 28—Hastings, and end at Omaha.

Hay Springs, Long Pine, and Kearney will take advantage of the airmen's visit to officially open their airports, while Lincoln will dedicate its municipal airport by a three-day program ending with the tour departure from the field.

At least one woman will pilot a plane in the tour and she will fly an Aeronca. Other makes of planes which have been entered include an Arrow Sport, Gipsy Moth, Curtiss Robin, Travel Air (both cabin and open models), Stinson, Ryan, Monocoupe, Kari-Keen, Eagle-rock, Waco, Cessna, Lockheed Vega, Spartan, Cavalier, Overland, Lincoln Page, Douglas, American Eagle, and Swallow.

Bach Firm Resumes Operations

VAN NUYS (CALIF.)—Limited production has been resumed by the Bach Aircraft Corp., located on the Los Angeles Metropolitan Airport, this city, after having been suspended for a 60-day period. Two de luxe Bach air cruisers have been sold recently and both are being rushed to completion for early delivery. In addition to continuing production on the standard model 10-place, Bach tri-engine, cabin monoplane, experimental work is being conducted on a new model which is to be tested late this summer.

Porterfield Wants Ad Campaign

KANSAS CITY (KAN.) — E. E. Porterfield, Jr., president of the American Eagle Aircraft Corp. here, is advocating a meeting of executives of the airplane manufacturers of the United States for discussing a coöperative advertising campaign to "sell aviation" to the layman. If the response from executives is great enough a meeting will be arranged to formulate plans.

Announce Officials For National Air Races

CHICAGO (ILL.)—Executive officials for the 1930 National Air Races have been appointed by Maj. R. W. Schroeder, chairman of the contest committee. The vice-chairman will be Frank A. McKay, who was a starter last year. Other offices are: Carl F. Egge, contest secretary; Capt. Ray Collins, chief starter; E. W. Cleveland, operations officer; Carl F. Schory, chief timer; Stuart F. Sinclair, chief scorer. Each of these officers will select his own assistants, and the complete staff will total about 100.

Several special features for this year's races have already been announced. Among them are five races for "sportsman pilots," although the committee has not yet definitely decided how to define an amateur aviator.

Planes are to be kept and serviced in spaces directly in front of the grandstand, somewhat similar to the pits used for racing automobiles. A stop and go signal to control visiting planes is being installed.

It is stated that Assistant Secretary of Navy for Aeronautics David S. Ingalls is planning to send a unit of eighteen Navy fighters, a squadron of twelve Marine Corps pursuit planes, a Naval acrobatic team of six machines, and the "Los Angeles" to the Races. Information on Army and National Guard participation will be announced at a later date.

Soucek in New Record Attempt

ANACOSTIA (D. C.)—Lieut. Apollo Soucek, who broke the world's altitude record for land planes recently, may have set a new seaplane record in a flight made here on June 15, when he reached an indicated altitude of 38,000 ft. Calibration of his barographs has not been completed as we go to press. The present record, made by Lieut. Soucek in May, 1929, is 38,560 ft., but as the calibration of his barographs in his recent land plane flight showed a height of more than 1,000 ft. greater than his altimeter had indicated, it is possible that the current check on his instruments will show the 328 ft. excess over the present mark necessary for the establishment of an official F.A.I. record. The flight was made in the same Wasp-powered Wright Apache used in his other record flights, but with the addition of pontoons and a different propeller setting.

Union Holding Co. Incorporated

LINCOLN (NEB.)—Formation of the Union Holding Co., with an authorized capital of $3,000,000, has taken place here, its holdings to include Sidles Airways, Inc., Havelock, Neb., and the Union Airport, which is operated by Sidles. H. E. Sidles is president of the new corporation and Charles Stuart, secretary and treasurer.

Aero Chamber Byrd Medal

COMMEMORATING THE CONQUEST OF THE POLES
BY REAR ADMIRAL RICHARD E. BYRD
AND HIS ASSOCIATES
THE AERONAUTICAL CHAMBER OF COMMERCE OF AMERICA

PRESENTATION of the gold medal, whose obverse side is pictured herewith, to Rear Adm. Richard E. Byrd will take place on June 25 by the Aeronautical Chamber of Commerce, which is tendering the flier-explorer a banquet in New York City on that date.

Seventy-three silver copies of the award, designed by Julio Kilenyi, New York sculptor, will be presented to members of the Byrd Antarctic expedition, while friends attending the affair will be given bronze replicas.

On June 23 Rear Admiral Byrd will broadcast a description of his South Pole flight over the Columbia Broadcasting System on a program arranged by the Tidewater Oil Sales Corp.

Aluminum Company Buys Firm

LOS ANGELES (CALIF.)—The Modern Foundry and Pattern Works, Oakland, Calif., has been purchased by the Aluminum Company of America, and it is planned to utilize that firm's plant for the manufacture of heat treated aluminum castings for airplanes and airplane engines. A branch office of the Aluminum Company of America has been opened at 1031 South Broadway, Los Angeles, in order to handle business in the Southern California, Arizona, and Utah territories. William C. Lynch has been appointed manager.

Russian Here for Chute Study

BUFFALO (N. Y.)—M. A. Savitzky, aviation engineer representing the United Aircraft Industries of Moscow, U.S.S.R., has arrived in Buffalo to make a month's study of the manufacture and use of parachutes at the plant of the Irving Air Chute Co., which is supplying the parachute requirements of the Soviet air force. The Irving company is planning the establishment of a branch plant in Moscow under a contract with the Soviet government.

C-W Aerial Survey Base in Tulsa

TULSA (OKLA.) — Curtiss-Wright Aerial Surveys has established southwestern headquarters here, with E. E. Ford as district manager.

New Army Contracts Total $5,963,419.38

WASHINGTON (D. C.)—Army Air Corps is to receive 402 new planes with spare parts, and 128 new engines and spare parts as the result of contracts totalling $5,963,419.38 recently approved, it was announced here June 16.

All the planes will be powered with Pratt & Whitney engines. The O-38 observation machines will be powered with Hornets and the rest will be powered with Wasps. The contracts were distributed as follows:

Douglas Aircraft Co. was awarded a contract for $2,221,623.60, covering 146 Model BT-2B basic training planes with spare parts, and 44 Model O-38 observation planes with spare parts.

A contract totalling $1,543,183.90, awarded the Boeing Airplane Co., of Seattle, Washington, a subsidiary of U. A. & T., covers 131 Model P-12C pursuit planes with spare parts.

Under its contract with the Air Corps, the Thomas-Morse Aircraft Corp. is to construct 71 Model O-19C observation planes, with spare parts, at a total cost of $1,018,126.20.

For the total sum of $437,832.65, Sikorsky Aviation Corp., will construct ten Sikorsky amphibions, with spare parts.

A contract for the 128 Cyclone air-cooled engines, Model R-1750 with spare parts, amounting to $742,643.13, was awarded the Wright Aeronautical Corp. These engines will be used in bombardment planes already bought.

A noticeable feature of all the new planes just contracted for will be the new instrument board, which will incorporate small round dial instruments.

Dayton Accessory Firm Expands

DAYTON (OHIO) — United Aircraft Products, Inc., was incorporated here recently as a successor to the National Aircraft Products Co., and capitalization was increased to $300,000. The corporation has bought additional land and buildings and has a general expansion program under way. It produces a general line of aeronautical accessories, including fuel pumps, fuel cocks, oil and gasoline line fittings, airplane engines, controls, and instruments. S. J. Sorensen is president of the firm, T. M. Hiester, vice-president and general manager; George A. Funkhouser, secretary; Joseph G. Lehman, treasurer; and R. G. Dykeman, chief engineer.

Army Stages High Aerial Attack

LOS ANGELES (CALIF.)—Army airmen from Rockwell Field, Coronado, recently simulated an aerial attack on this city with some of the maneuvers taking place at an altitude of about 30,000 ft. Curtiss Condors and Boeing pursuit craft, the former from the 11th Bombardment Squadron, San Diego, and the latter from the 95th Pursuit Squadron, participated.

Attachable Parachute Developed by Russell

SAN DIEGO (CALIF.)—Development of a quick attachable parachute for the use of passengers in air lines is announced by the Russell Parachute Co. of San Diego. Following extensive tests and research work the pack, embodying the fundamental principles of the Russell lobe chute, was submitted to successful actual tests June 8, at Los Angeles Municipal Airport.

The principal feature of the passenger parachute is the single attachment which makes it possible to fix the pack carrier to the harness with one movement.

The pack carrier is placed in a rack beside or above the passenger's seat in the plane. It is in all respects similar to the standard Russell chest pack carrier, but with a nickel steel snap, having a strength of 10,000 lb., in the center of the pack carrier frame, to which the main lift webs in the pack are attached.

When the parachute is to be brought into use the snap on the pack carrier is fastened to a chrome plated fitting, also capable of withstanding a force of 10,000 lb., which is attached to the harness at the wearer's chest.

Other features of the passenger parachute are the velour jacket covering of the harness which the wearer puts on as a sleeveless coat, and the pack carrier covering which also is of velour. The harness is made of regulation linen webbing of 2,500 lb. tensile strength.

During experiments the wearer rose from his seat, took the chute from the rack and attached it to the harness, opened the cabin door, fell clear of the plane, pulled the rip cord, within 10 sec.

Deliver Seven American Eagles

KANSAS CITY (KAN.)—Recent deliveries by the American Eagle Aircraft Corp., Fairfax Airport, this city, include three of the new 100 hp. Kinner Model 201, one Kinner-powered A-129, and three biplanes, Model 101, with OX-5 engines.

Consolidated Tests 30-Place Commodore

BUFFALO (N. Y.)—Launching of the first 30-passenger and three-crew Commodore, built by the Consolidated Aircraft Corp. for Nyrba, took place here in the Niagara River on June 11.

The Miami, as the craft has been named, was subsequently put through flight tests the next day before Department of Commerce officials. I. M. Laddon, chief engineer of the company, is responsible for the incorporation of various engineering and design modifications into this enlarged Commodore.

Powered with two Pratt & Whitney Hornets, the craft is 68 ft. long and has a span of 100 ft. Passengers may enter the machine from the side or from the front, which opens into the salon, seating six persons and equipped with two day beds. Behind this compartment are three eight-passenger sections, a buffet, radio room, and lavatory, with space for mail and express being provided for in the tail.

It is announced that four more 30-passenger Commodores are now under construction for the New York, Rio & Buenos Aires Line, which will shortly take delivery on this first one.

New York University Announces the Inauguration Of An Airplane Extension Course This Coming Fall

NEW YORK (N.Y.) — Preliminary trips by plane are being made by several members of the New York University teaching staff in preparation for an Airplane Extension Course to be inaugurated by the University this Fall.

Plans for this new project were lately announced by Dr. John W. Withers, dean of the School of Education, whose party on the survey tours includes Prof. Milton E. Loomis, assistant dean; Robert H. Spaulding, specialist in aeronautical education; Prof. Ned H. Dearborn, director of the Institute of Education; and Prof. Robert K. Speer, chairman of the elementary education department; all of the New York University School of Education.

On the first flight made to establish contacts with various educational and civic officials in various towns and cities, the group visited municipalities in New York and New Jersey in a Wright-powered, Travel Air cabin plane, piloted by Capt. John O. Donaldson, president of the Newark Air Service.

According to present arrangements the Airplane Extension Course will be carried to teachers in grade, high schools, and other institutions of learning in New York, Massachusetts, Delaware, and Maryland by "flying instructors."

Commenting on the proposition, Dean Withers said: "Advantages to be derived from extension courses on the ground have possibilities for the improvement of teachers in service which, we believe, are not inherent in courses on the campus. By meeting the teachers in their own fields we now may give all the instructors in one school the same program while by campus instruction we were able to reach only one or two teachers from each school.

"It is our purpose to cooperate with local school officials in helping them to solve the problems which are to them the most demanding of solution. Through our extension course and airplane transportation our staff will be able to assist not only the administrative and supervisory officers in many communities but we may go into the classrooms and assist teachers in the development and application of techniques best suited to their needs."

Invents Balance Unit For Metal Propellers

PHILADELPHIA (PA.)—Nelson V. Johnson, a planner and estimator at the Naval Aircraft Factory here, has invented a device which makes it possible to balance a metal propeller without removing the propeller from the shaft.

It consists of an adjustable plug which is inserted in a standard hole of safe diameter. This plug is essentially a geared screw stem with keyed units, betwen which weights made in varying sizes of lead, brass, or steel may be manipulated to obtain proper longitudinal balance.

A geared stem and locking unit at 90 deg. to the main screw stem provides for a final micrometer adjustment of the balance after the blades have been assembled in the hub and placed on the balance stand. The end of this plug is equipped with an arrangement for fastening different size lead discs on the root end of the propeller blade to obtain transverse balance if desired.

Heretofore, drilling and plugging of the steel root has been employed for obtaining balance and the Navy has found it necessary to x-ray the propeller before it is put in use to ascertain any weakness that the balancing operation might have caused.

Delivered 51 Stinsons in May

DETROIT (MICH.)—Fifty-one planes were shipped by Stinson Aircraft Corp. during the month of May, William A. Mara, vice-president, has announced. This is a 54.6 per cent increase over April, when 33 planes were delivered. The company now has approximately 65 unfilled orders on hand and plans to build 75 planes this month. The Lycoming Manufacturing Co., Williamsport, Pa., which, like Stinson, is a subsidiary of the Cord Corporation, is supplying engines to Stinson at the rate of fifteen weekly.

New Quarters for Mooney Firm

WICHITA (KAN.)—Mooney Aircraft Co. will move from its present quarters north of Wichita to the old Swift Aircraft Co. site adjacent to the municipal airport. The Swift building and ten acres of ground of the original 40 acres have been purchased by the Mooney interests. The new Stearman factory will go up on the remaining 30 acres. The firm, with E. W. Mooney as president and designer, makes a low-wing, cabin monoplane.

Houston Donates Sum for Race

HOUSTON (TEX.)—Lap prize money to the sum of $1,000 has been posted as Houston's contribution to the forthcoming Cirrus All-America Flying Derby by the aviation committee of the Houston Chamber of Commerce. Houston Municipal Airport has been designated an overnight stop.

Cites Cost Comparison Of Auto, Aero Engine Parts

DETROIT (MICH.) — Comparative costs of automotive and aircraft engine parts were outlined to the American Society of Mechanical Engineers by O. E. Szekely, of Holland, Mich., in a paper presented at that organization's semi-annual meeting here, June 9-12. Mr. Szekely is president of the Szekely Aircraft and Engine Co.

After pointing out the excessively high prices asked for aircraft engine parts as compared with the same parts for automobile engines, Mr. Szekely charged that particular situation to the failure of aircraft engine manufacturers to take heed of "already established principles, methods, and costs of operations readily available in the automotive industry." Speaking of standardization the speaker said:

"So far no standards have been established, and each and every manufacturer of aircraft engines has an idea of his own as to the necessity of the parts being truly a special unit unlike any other on the market, while if, under the proper methods of production, parts were to be standardized or nearly so, the net labor cost and overhead figures in the manufacture of aircraft engines would drop to an acceptable level."

Mr. Szekely's paper was entitled: "Automotive Methods and Practices Involved in Aircraft Engines." Other aeronautical articles read before the A.S.M.E. here were "Airplane Spruce," by E. J. Fishbaugh, of the Posey Manufacturing Co., Hoquiam, Wash.; "Air Transportation," by Paul Goldsborough, vice-president of Aeronautical Radio, Inc., Washington, D. C.; "Motorless Flight," by Donald F. Walker, manager, National Glider Association; and "Training of Aeronautical and Automotive Service Mechanics," by Prof. A. D. Althouse, of Cass Technical High School, Detroit.

Another Record for Sergievsky

NEW YORK (N.Y.)—Climbing to around 30,000 ft. in a Sikorsky seaplane with a load of 500 kg. (1,100 lb.), Boris Sergievsky set a new International Record for planes of that class on June 15. The previous record of 27,749 ft. was set by Fritz Harder of Germany in November, 1928, with a Junkers plane. The Sikorsky S-38 amphibion, whose wheels had been removed, was powered with two specially supercharged Wasp engines. The new record is, of course, subject to homologation by the F.A.I. Three previous records made by Sergievsky, who was formerly a Captain in the Russian Air Force, have not yet been homologated because of some question as to his present nationality.

Four Wacos to Mass. Firm

QUINCY (MASS.) — Three Model F Wacos have just been delivered to the Dennison Airport Operating Co., and another will be received shortly.

A View of the New Martin Bomber Recently Tested

THE NT5M-1 "DIVING BOMBER," built by the Glenn L. Martin Co., Baltimore, has just completed 30-day tests, conducted at the Hampton Roads and Anacostia Naval Air Stations, which included power dives of over 6,000 ft., the plane coming out of that maneuver with the bomb still in place.

"QUOTES"

Canada Has Done Well. "No country has a sounder development in aviation than that of Canada. Some countries have developed aviation more rapidly, some have more extensive airways—but none has kept her airway development in better accord with her needs—her actual, not her theoretical needs."—J. A. WILSON, Controller of Civil Aviation, Canada.

Florida's Aeronautic Growth. "Florida is the connecting link for trade and travel between the Americas. We are now at the opening of endless opportunities. Had the state been airminded at an earlier date, it would now be enjoying aviation manufacturing that is established in many western states that are reaping their reward."—GOVERNOR CARLTON of Florida.

Except. "No faster way between the Mississippi and the Atlantic Seaboard except by air."—Railroad Advertisement.

Reactions Changing! "When is the next plane to New York"?—Question of passenger just taken from plane that fell in Boston Harbor.

Berry Brothers' Executives Tour

DETROIT (MICH.)—T. B. Colby, sales manager for Berry Brothers, Inc., of this city and Walkerville, Ont., recently made a month's trip by air during which he visited numerous aircraft plants and cities in the East. C. L. Forgey, director of advertising for the company, is touring the West Coast and leading intermediate cities contacting with clients and dealers.

Will Start Work Soon On New Stearman Plant

WICHITA (KAN.) — A preliminary survey of the Wichita site for the new Stearman aircraft factory will be made shortly and work on the project, is now scheduled to begin before the end of the month according to a recent announcement.

Austin Company, Cleveland, has been awarded a contract for the erection of the new manufacturing plant and a two-story administration building. With equipment the structures will cost approximately $1,000,000.

Plans for the new plant call for a main factory building of modern design offering 80,000 sq.ft. of floor space.

Announcement of the plan to build a new factory for the Stearman unit was made by U. A. & T. officials following a conference with Lloyd Stearman, founder of the concern bearing his name, and other Stearman representatives in New York. It was thought that the factory would be removed to some Eastern point, but the site of the defunct Swift Aircraft Co. here was finally decided upon and purchased from the receiver.

The Swift purchase makes 30 acres available to Stearman for the factory. This ground is located just across the road from the 640-acre Municipal Airport which, city authorities have agreed, will be made available to the company for the testing of planes. The company already has a large permanent hangar on the municipal field.

Stearman at present occupies two buildings north of Wichita that were part of the Bridgeport Machine Co. holdings. The new location is situated southeast of the city proper.

AERONAUTICAL FINANCE

By R. R. Doane

Statistical Summary

Weekly Comparisons

	Week Ended June 12	Previous Week	Same Week 1929
Aviation:			
Aviation stock averages	21.38	26.00	45.56
Number of stocks traded in (1)	46	43	64
Volume aviation share sales (2)	415,800	357,900	786,000
Ratio aviation share sales to total share sales (3)	2.46	2.95	2.88
General Market Data:			
Total volume share sales N.Y. and curb exchanges	16,892,300	12,130,800	27,213,130
Railroad share sales N.Y.S.E.	280,670	244,470	1,095,780
Market averages (N.Y. Times)	229.18	230.10	248.25
New domestic financing	$58,772,500	$45,228,000	$60,531,000
Financial: (4)			
Reserve credit extended	$943,213,000	$978,652,000	$1,227,818,000
Brokers' loans	3,998,000,000	4,101,000,000	5,284,000,000
Bank exchanges, N.Y.C.H.	7,976,560,534	5,429,258,102	8,122,820,405
Investments, reporting member banks	5,919,000,000	5,811,000,000	5,779,000,000
Loans on securities, reporting member banks	8,605,000,000	8,246,000,000	7,197,000,000
All other loans, reporting member banks	8,434,000,000	8,416,000,000	9,140,000,000

Notes—(1) All stocks actively traded in on both New York Stock Exchange and the Curb Exchange; also contains over-the-counter stocks on which bid and ask quotations are regularly published. (2) Total volume both N. Y. Stock and Curb Exchanges. (3) Percentage of aviation stock trading to total volume of sales all classes of stocks on both exchanges. (4) Weekly Reporting Member Banks, Federal Reserve System.

Table I—Capitalization Changes

Items	Aviation Corp'n	Curtiss-Wright	United Aircraft
(1) Estimated original capital investment	$35,000,000.00	$150,000,000.00	$25,000,000.02
(2) Capital investment. Dec. 31, 1929	35,956,467.54	61,962,085.93	37,323,601.22
Total assets as of Dec. 31, 1929	39,121,132.63	78,472,925.19	41,335,365.70
Current assets, Dec., 31, 1929	23,250,227.33	26,749,941.68	27,450,233.30
Current liabilities, Dec., 31, 1929	1,656,845.75	10,483,044.02	3,158,209.90

(1) As reported by Ernst & Ernst, New York.
(2) Capital,, surplus and reserves as carried on the liabilities side of balance sheet.

Table II—Reserve Comparisons

Items	Aviation Corp'n	Curtiss-Wright	United Aircraft
Depreciation	$1,622,464.57	$3,179,125.87	$1,760,471.30
Other reserves	2,937,998.60	.....	.....
Marketable securities	5,314,123.00	46,961.75	7,346,082.42
Total reserves	$9,894,586.17	$3,226,087.62	$9,106,553.72
Less marketable securities	4,580,463.17	3,179,125.87	1,760,471.30
Less profit and loss—depreciation—deductions (1)	1,275,505.39	2,599,621.07	1,104,679.17
Estimated balance based upon previous statements	$346,959.18	$579,504.80	$655,792.13

(1) Year ended Dec. 31, 1929 and first quarter 1930.

Table III—Market Valuation Comparisons

Items	Aviation Corp'n	Curtiss-Wright	United Aircraft
Value as of date of issue	$70,080,450.00	$186,881,250.00	$165,925,530.00
Current market value, 6/12/30	19,112,850.00	48,277,650.75	110,617,020.00
Net change	—$50,967,600.00	—$138,603,599.25	—$55,308,510.00
Per cent decline	72.7%	74.1%	33.3%
Book value, Dec. 31, 1929	35,956,467.54	61,962,085.93	37,323,601.22
			Common Preferred
Book value per share	11.26	9.94	13.83 155.52
Market value, 6/12/30	6.00	7.75	61.50 64.00

Table IV—Earnings Comparisons

Items	Aviation Corp'n	Curtiss-Wright	United Aircraft
Year ended Dec. 31, 1929	Def. $1,443,822.17	Def. $668,532.04	Net $9,516,960.21
First quarter 1929	(Not available)	(Not available)	Net 2,102,940.20
First quarter, 1930	Def. 863,651.41	Def. 1,620,920.00	Net 900,391.00
Six months ended June 30, 1929	Net 787,087.27	Net 3,075,618.62	Net 5,133,858.77
Earnings per share:			
1st quarter, 1929	.....	.....	Net 1.05
1st quarter, 1930	Def. .27	Def. .26	Net .39

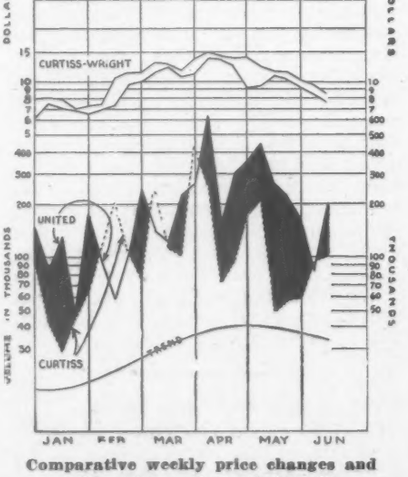
Shifting Capital Values

Aeronautical capital values have recently undergone the most serious declines of the year. However, the aircraft industry has not stood alone in this mid-season revaluation process. As may be observed in the accompanying chart study which gives the weekly high and low spread of the two leaders, in point of share sales volume, there has been a very faithful movement conforming with that of the market as a whole, and one as previously pointed out here quite independent of internal company conditions. This is especially noticeable in the two stocks here compared because of the wide divergence in their earnings record.

If anything is to be inferred from this action of the price of fixed capital (shares) it is that the struggle to determine intrinsic values in this industry as in others is yet far from being settled.

The prevailing unsettlement of ideas regarding such values has doubtless contributed much to the present confused condition of the entire securities market. As pointed out in this column [May 24 issue] in a detailed study of current valuation methods, from ten to fifteen times earnings in a sluggish and hesitant market would approximate the best that could be expected by way of average stock prices. That stocks have since declined to this basis while awaiting more definite evidence of developing earning power is not surprising.

That there should be even further recessions scattered among the air stocks should not prove discouraging although this month-end will probably witness a rally. A return to sound levels of value is at this time far more desirable than the extravagant supervalues of too unsubstantial a character to be long maintained. When this point is reached aeronautical securities may take on a much nearer investment nature



Comparative weekly price changes and sales volume of Curtis-Wright and United Aircraft

Table V—Comparative Position

(Based on public statements of Company officials)

Items	Aviation Corporation	Curtiss-Wright	United Aircraft
Sales	"Aggressive sales program now under way; program now under way promising substantial results."	"Sales steadily increasing; one third total sales U. S. are Curtiss products."	"Sales definitely on the upward trend."
Production	Fairchild Company reports production about 25 planes per month—normal.	"Buffalo plants reported as maintaining 1929 level, 22 planes per month. Keystone-Loening plant at capacity."	"Pratt & Whitney producing between 120 and 140 engines monthly."
Operations	Executive and operating departments reorganized. Passenger transport lines report increase in passengers carried.	"Paterson, N. J. plant at 20% capacity. Operations of subsidiaries substantially reduced."	"Business of Chance Vought and Sikorsky have been retarded by establishment of new quarters. Transport business improving."
Cash Position	Based on previous year-end report; cash ratio of 15 to 1 over current liabilities.	"There will be no additional financing this year. Rapidly liquidating old stock." Inventory and debt reduction beneficial to current cash position.	Cash position based on last report ratio of 5 to 1 over current liabilities.
Earnings	Earnings expected to increase under new contract schedules.	"Not much can be expected from income statement until 1931. Making no effort to show earnings at present."	Earnings on upward trend during past 2 mos. Sikorsky should show good profit for 1930.
Unfilled Orders	(Not reported).	"As of May 15, company had Government and commercial orders for prompt delivery totaling $10,735,000." $743,643 additional reported since that date.	"Company orders now in neighborhood of $9,000,000. Government orders pending which will increase this amount by about $8,000,000"
Prospects	Passage of Watres Bill greatly improves outlook for practically all of company's transport units. Ten units will receive materially higher rates.	"Expect decided improvement in the 3rd quarter with the deficit shown by the company in that period substantially reduced."	"Present indications point to earnings continuing their upward trend for remainder of year. Highly probable that 1930 gross business will exceed 1929".

than their present highly speculative traits now warrant.

In this respect it may be definitely stated that no pronounced upward movement or sound rehabilitation in values can be expected until *after the end of the present depression* or period of uncertain earnings has reached its culmination.

A comparison of the dollar performance of three prominent units of the industry discloses the extent of recent capitalization changes. The companies chosen were taken because of the wide public interest in them, the size and importance of their capital assets, and because of the availability of more or less complete data regarding them.

The absence of funded debt among aeronautical companies is a large factor in their favor during severe readjustment periods. Of the total number of aircraft organizations both in this country and Great Britain there is probably less than $5,000,000 of funded obligations—and that is spread so thin as to become an item of relative unimportance.

Along with this absence of funded debt comes the greatly improved financial and managerial skill of recent years permitting highly flexible corporate structures as significant factors contributing to the solvency of corporations during periods of strain. From the financial standpoint a typical illustration may be found in the adequate reserves for depreciation and depletion (see Table II).

The market valuation comparisons as shown in Table III are based on current security quotations at the time of issue as against present prices. As the larger number of shares were traded in for existing shares of the consolidated companies on the then high valuation basis the declines here shown represent the extent of the deflationary process, and as such are more or less bookkeeping entries rather than representative of actual dollar losses.

Severe as these losses have been, however, additional income bearing surplus reserves makes it quite possible for a large number of aircraft companies to minimize current adjustment losses and maintain their position pending the development of the more profitable programs now under way.

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Curtiss Aero & Motors

The Curtiss Aeroplane & Motors Co. reported for the quarter ended March 31 a net loss of $61,449 after all charges, compared with net income of $386,237, or $1.11 a share in the same period of 1929.

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Wright Aero

The Wright Aeronautical Corp. reports for the March quarter net loss of $384,857 after charges, against net profit of $533,925 after taxes in 1929 period.

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Kari-Keen Issue

Kari-Keen Aircraft, Inc., will issue $40,000 in preferred stock coincident with reorganization of its manufacturing operations, Royal Miller, president, announced. The new stock will provide additional capital for manufacturing operations and the marketing of the new Kari-Keen Model 90.

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Great Lakes Aircraft

J. A. Abeles, chairman, Great Lakes Aircraft Corp., has announced that the company has weathered the readjustment in aviation and is now in an excellent financial position. Current ratio of assets to liabilities are around twelve to one, with a large portion of assets being in cash. A detailed statement of the company's condition will be issued shortly.

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Report 1930 Bellanca Sales

Bellanca Aircraft Corp., New Castle, Del., reports for the five months ended on May 31 sales of $281,335, compared with $132,873 in the corresponding period of 1929. Orders for June delivery total $110,365, making the minimum business for the first six months of this year $391,700 compared with $200,984 in the first six months of 1929.

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Air Investors Holds Election

At the annual meeting of Air Investors, held at New York City, Edward P. Warner, editor of AVIATION; James M. Hutton, Jr., J. Gates Williams, and Allan W. Ames were elected to the board of directors.

PERSONNEL

P. G. JOHNSON, president of Boeing Airplane Co., has been elected vice-president of Boeing Aircraft of Canada, succeeding C. G. BEECHING, resigned. Mr. Johnson has also been re-elected president of Pacific Air Transport, and W. E. BOEING has been re-elected chairman of the board.

L. O. KENNEDY has been named Southern California traffic manager for Boeing system, with offices in the Associated Realty Building, Los Angeles.

MAJ. EDWARD C. LANDON took over the duties of manager of Fairfax Airport, Kansas City, Kan., June 6. He was recently manager of the Saunders Fly-It-Yourself System. R. F. CRAIG, assistant to President Guy E. Stanley, who has been acting manager of the airport, returns to his other duties. He is also treasurer of Woods Bros., holding company for Fairfax Airport, Inc.

E. C. Landon

FRED K. BAXTER, recently manager of Consolidated Air College, has been appointed divisional sales manager for American Eagle Corp. in Missouri, Kansas, Iowa, Nebraska, and Colorado. He will be assisted by B. T. FLANERY, formerly manager of Chanute, Kan., airport.

COL. CHARLES A. LINDBERGH, who holds the rank of Captain in the Missouri National Guard, has been transferred at his own request to the National Guard Reserve.

A. J. GORDH, recently vocational director, has been made sales manager of Shank Flying Service, Robbinsdale, Minn., succeeding VAL LUND, who has resigned to enter the July class of the Air Corps at March Field, Riverside, Calif.

H. P. WHITTLE, former president of Aviation Mechanics Association, Inc., has been made chief instructor of Aviation College, Inc., operated in connection with Robbins Flying Service, Akron, Ohio.

MISS MARGARET THOMAS has been elected president of Dallas (Tex.) Girls' Flying Club, succeeding MISS JEAN LA RENE.

COL. JACOB E. FICKEL, executive officer at Wright Field, Dayton, Ohio, is to leave Wright Field next month to go to Washington, D. C.

CAPT. PEYTON GIBSON has been made technical adviser to J. Cheever Cowdin.

C. B. PIRIE, former purchasing agent, has been made general manager and assistant to the president of Arrow Aircraft & Motors Corp., Lincoln, Neb. JAMES FISHER, manager of Arrow Airport, Inc., Arrow Flying Service, Inc., and Arrow Flying and Trade Schools, has been made factory superintendent of sales. MILTON SCHULTZ, chief instructor, has been made assistant manager of the airport, flying service, and schools. RALPH E. ANDERSON, recently sales manager for Lincoln Aircraft Co., is now Arrow district sales manager in the Middle West. L. E. MILLER, formerly purchasing agent for Fleetcraft Airplane Co., has been made manager of the truck service department for Arrow. ROBERT KING is to be assistant purchasing agent.

R. E. POLLOCK has been made general manager of Bowlus Sailplane Co., San Diego, Calif., succeeding CLYDE FREEMAN.

CHARLES N. CUTTER, former manager of the Colonial Air Transport Office at Hartford, Conn., is now traffic manager of New England & Western Transportation Co., Springfield, Mass.

HERBERT HOOVER, JR., has been made head of a newly formed engineering division of Western Air Express, under which are the departments of communications, airports and airways, dissemination of weather information, and aeronautical engineering. J. G. FRANKLIN has been put in charge of communications, and F. C. WHITING in charge of airports and airways.

FRED J. SCHREINER has been put in charge of student training for Hans Mirow Flying Service, Portland, Ore.

STANLEY PIASECKI is now permanent manager of the Milwaukee, Wis., county airport. FRED BELL is his assistant.

FLOYD A. ROBB has been named district passenger agent for West Coast Air Transport at Portland, Ore. He was formerly with Aerial Mapping Engineers, Inc.

RALPH DAMON, recently assistant to J. A. B. Smith in the New York Curtiss-Wright office, has returned to St. Louis in charge of production at the Curtiss-Robertson factory there, and he is also in charge of the Travel Air Co. at Wichita, Kan.

C. E. JOHNSON is operations manager for Pacific Air Transport at Oakland Municipal Airport, instead of at Portland, Ore., as erroneously reported in AVIATION May 31.

GEORGE F. HARTWIG, JR., recently eastern field service manager for Consolidated Instrument Co., Inc., is now sales engineer for American Viscosimeter Co., Inc., New York, N. Y.

FRED E. MACHESNEY, chief pilot and manager of the Rockford (Ill.) Airport, will also manage Goodall Airport at Beloit, Wis.

LIEUT.-COMDR. KARL LANGE, who has been in charge of the "Volunteer" for the past year, is to be chief operations officer at the Goodyear airship base at Akron, Ohio. LIEUT. B. F. CAMPBELL will command the "Volunteer."

ALBIN K. PETERSON, formerly chief engineer for Kreutzer Aircraft Corp., is now filling that position with Hodkinson Aircraft, Inc., Glendale, Calif.

CARL W. SCHELLBACH, Los Angeles, Calif., has been awarded a military scholarship at Kelly Field, Tex.

AERONAUTICAL CALENDAR

June 23-29	Second all-Nebraska Air Tour.
June 28	Annual R.A.F. Display, Hendon, Eng.
July 4	National Elimination Balloon Race, Houston, Tex.
July 4-19	New York State Air Tour, starting from Buffalo.
July 5	English King's Cup Race.
July 9-18	Second Michigan Air Tour, sponsored by Board of Commerce, Pontiac, Mich.
July 12-13	International Rally to Liege, Belgium.
July 20-Aug. 7	International Light Plane Tour, starting from Tempelhof Airport, Berlin, Germany.
July 21	All-America Flying Derby, starting from Detroit, Mich. Sponsored by American Cirrus Engines, Inc., Marysville, Mich.
Aug. 9-24	International Gliding Meet, auspices Rhoen-Rossiten Gesellschaft; the Wasserkuppe, East Prussia, Germany.
Aug. 23-Sept. 1	National Air Races, Chicago, Ill.
Sept. 1	Gordon Bennett International Balloon Race, Cleveland, Ohio
Sept. 11-27	National Air Tour, starting and ending at Detroit, Mich. Manager: Capt. Ray Collins.

EXPOSITIONS

June 28-July 6	Pacific Coast Aeronautical Exposition, Oakland, Calif., Municipal Airport.
June 28-July 6	Aviation Show, Oakland, Calif., sponsored by American Legion, Northern California Aero Club, and Oakland Chamber of Commerce.
July 1-6	Aircraft and Sportsman's Exposition Transcontinental Airport, Toledo, Ohio
July 6	International Transportation Exposition, Warsaw, Poland.
Sept. 6-8	International Aero Exhibition, Stockholm, Sweden.
Nov. 28-Dec. 14	International Aero Show, Grand Palais, Paris, France, under the auspices of Chambre Syndicale des Industries Aeronautiques.

MEETINGS AND CONFERENCES

July 3-5	Western States Aeronautical Conference, Medford, Ore.
July 11-12	Aeronautical Chamber of Commerce, Western District Meeting, Denver, Colo.
Aug. 18-21	National Legislative Air Conference, Levy Mayer Hall of Law, Northwestern University, Evanston, Ill.
Aug. 26-28	S.A.E. Aeronautic Meeting, Chicago, Ill.
Sept. 1-6	Fifth International Air Congress, under the auspices of the Royal Aero Club; The Hague, Holland.

DEDICATIONS AND MEETS

June 21-22	Allentown, Pa., Airport.
June 23	Lincoln, Neb.
June 28	Curtiss-Steinberg Airport, E. St. Louis, Ill.
June 28-29	Tyler, Tex., Municipal Airport.
June 29	Ida Grove, Iowa.
July 4	Kelso, Wash., Airport.
July 4	Curtiss-Wright Airport, Milwaukee, Wis.
July 4	Air Races, Anderson, Ind.
July 4-5	Harrisburg, Pa.
July 4-6	Air Meet, Lake Placid, N. Y., Airport, under the direction of Lake Placid Flying Service.
July 4-6	Dedication and meet, Milford, Pa., Airport.
Aug. 1-2	McGhee Tyson Airport, Knoxville Tenn.
Aug. 2-3	Air Meet, Danville, Ill.
Aug. 9-10	Air Fair, Grand Rapids, Mich., Airport.
Sept. 1	Wauchula, Fla., Airport.
Sept. 13-14	Duluth, Minn., Airport.
Sept. 13-14	Williamson Johnson Airport, Duluth, Minn.
Oct. 17-20	Denver, Colo., Municipal Airport.

BRIEFLY

The Goodyear airship Volunteer is being used in making a special survey of the San Francisco region with a view to determining its suitability for operation of lighter-than-air craft, locating sites for mooring masts, etc. A temporary mast has been erected for it at the old stadium in Golden Gate Park.

Miss Bobbie Trout recently reached an altitude of 15,200 ft. in a Curtiss Robin, and claims an altitude record for women using OX-5 powered planes.

Valspar Corp., New York, N. Y., has taken over Detroit Graphite Co., and Dominion Paint Works, Ltd., Walkerville, Ont.

Capt. F. M. Blunk is making a survey of Florida to locate suitable terrains for gliding.

W. Hawley Bowlus, president of Bowlus Sailplane Co. is making a demonstration and sales tour in the Middle West.

The Secretary of War has authorized Capt. Ricardo Rodas and Capt. Tomas M. Latona, of the Guatemalan Army, to enter the Primary Flying School at Brooks Field, San Antonio, Tex.

Boeing Plane Co., Seattle, Wash., is making a $5,000 addition to its shop building at 330 West Front Street.

Walter Bullock and C. W. Holman, of Northwest Airways, Inc., have been sworn in as deputy sheriffs on the recently formed aerial law enforcement patrol of Hennepin County, Minn.

Agricultural Director Davis of the East Texas Chamber of Commerce has approved results obtained by sowing a large pature at Beaumont, Tex., with clover seed from an airplane last fall.

The ramp adjacent to the plant of Glenn E. Martin Co., Baltimore, Md., is now completed and in service.

The slogan "If you cannot see—do not fly" was adopted by 75 members of the Professional Pilots' Association who met recently in Los Angeles.

Prest-O-Lite Co., Inc., has opened a new plant at 1240 Stewart Ave., S.W., Atlanta, Ga.

Louis E. Emerman & Co., Chicago, dealers in used machinery, has bought a plane to provide transportation for customers.

Lieut. T. G. W. Settle, head of the navy's inspection bureau at the Goodyear-Zeppelin Corp. plant, Akron, Ohio, has qualified for licenses as pilot of free balloons, dirigibles, airplanes, and gliders.

Ricardo Toledo, postmaster general of Costa Rica, is in the United States studying methods of establishing aerial police forces.

Col. Virginius E. Clark, engineer for The Aviation Corp., addressed the June meeting of the Buffalo (N. Y.) Aero Club on "What the Aircraft of 1935 Will Be and Do."

The U. S. Senate Naval Affairs committee has approved an item of $50,000 to purchase an additional 30 acres for the airport at Sand Point, Seattle, Wash.

Attempts are being made to secure the plane in which Carl Ben Eielson flew across the North Pole with Sir Hubert Wilkins for the Eielson Memorial Museum in North Dakota. The plane is now owned by the Argentine Government.

A Boeing 80-A transport is to be tested by the Army Air Corps at Dayton, Ohio.

Heyman Rosenberg, vice-president of Parker-Kalon Corp. and inventor of that brand of self-tapping screws, has been awarded a certificate of merit by Franklin Institute of Philadelphia.

John and Walter O'Toole have taken over operation of Old Colony Airways and Muller Field, Revere, Mass., from Al Bradish, the former proprietor.

Representatives Named

FLEET—Air Associates, Inc., service and repair dealers, at Roosevelt Field, L. I., N. Y., and at Cicero Airport, Chicago, Ill.

WARNER SCARAB ENGINES — The H. F. Wilcox Aeronautics, Inc., Tulsa, Okla., sales and service representative for Oklahoma, Arkansas, Kansas, and Texas.

PACKARD DIESEL—Service & Sales Co., Portland, Ore., for Oregon.

AERONCA—James C. Keogh, Curtiss-Chicago Airport, Glenview, Ill., for Illinois and the lake-shore counties of Indiana.

STINSON—Aviation Sales and Service, Minneapolis, Minn.

AMERICAN EAGLE — Puritan Air Transport Corp., Mendon Airport, Mendon, Mass.

BOWLUS SAILPLANES AND GLIDERS—Arrow Agents, Inc., Chicago, Ill.; San Angelo Glider Club, San Angelo, Tex., for western Texas.

CRAWFORD POWDERED GLIDER—E. G. Hopkins, Portland, Ore.; Herman M. Stuki, Shelby, Mont.

New Firms Announced

LAND OF LAKES AIRWAYS, Oconomowoc, Wis; capital, 500 shares of common stock at $100 per share; by W. Ehrengart, J. Flanagan, and S. Albert.

RHODE ISLAND FLYING SERVICE, Pawtucket, R. I.; Clifford T. Burgess, pres., Joshua Crane, Jr., vice-pres., Wayne Langley, sec'y., Arthur Ormsby, operations manager; to operate the What Cheer Airport, Pawtucket.

QUEBEC STINSON AIRCRAFT AGENCY, LTD., Montreal, Que.; capital, $49,000.

CLARK AIRPLANE CORP., Ponca City, Okla.; capital, $50,000; by Richard D. Clark, Charles D. Reed, and George E. McPhail; to manufacture airplanes.

DUBUQUE AIRWAYS, INC., Dubuque, Iowa; capital, $25,000; Edward B. Tegeler, pres., J. W. Zehetner, vice-pres., Donald Meissner, sec'y-treas.; to operate the Dubuque Airport.

SCHOOLS

SPARTAN SCHOOL OF AERONAUTICS, Tulsa, Okla., has opened a branch at Ponca City, Okla., with two instructors and one plane stationed there.

UNIVERSITY OF MINNESOTA, Minneapolis, awarded the degree of Bachelor of Aeronautical Engineering this year for the first time. Four students received the degree.

STANDARD FLYING SCHOOLS, Los Angeles, Calif., has announced that it will refund all or part of the fares over Western Air Express or affiliated lines paid by students flying to Los Angeles to enroll at the school. Students enrolling for the transport course will have their full fare paid; for limited commercial work, half, and for the private pilots' course, one fourth.

HANS MIROW FLYING SERVICE, Portland, Ore., is a new flying school organized by Hans Mirow, formerly co-pilot with West Coast Air Transport.

PITTSBURGH SCHOOL OF AVIATION, Pittsburgh, Pa., recently graduated twelve students from its engine mechanics and aircraft welding courses.

PACIFIC GLIDER SCHOOL, San Francisco, which was formally opened on June 14-15, is offering instruction in primary, secondary, and soaring gliding. E. B. Laferty is in charge.

SKYWAYS, INC., Boston, Mass., recently opened its summer flying school at the Cape Cod Airport, Marstons Mills, Mass., for the second season.

Trade Tips

Bids are being received for the construction of a stucco administration building to be built at the Sweetwater (Tex.) Municipal Airport, in accordance with plans already approved.

The Board of Public Service, St. Louis City Hall, will open bids June 24 for construction of a hangar at the municipal airport.

Bids are to be asked soon for construction of a combined hangar and service shop at the Atlantic Airport, Westerly, R. I. Joseph S. Santin, Mystic, Conn., is in charge of the project.

Construction of a $100,000 hangar is planned at Bowman Field, Louisville Municipal Airport.

An open cockpit plane is wanted by the J. A. N. Aircraft Co., Pontiac, Mich., and a four-place cabin plane is wanted by the Hartung Corp. of Detroit.

Lakeshore Airway Corp., Muskegon, Mich., is in the market for two approved parachutes for school work.

Contract for dismantling, removal, and re-erection of $75,000 all-steel Army hangar from present location at Little Rock, Ark., to Hensley Field, Dallas, Tex., is to be awarded soon.

N.B. Additional information concerning trade possibilities will be found in the column headed "Airport Construction Projects."

AIRPORTS AND AIRLINES

Uncertainty Marks Change in Air Map

Postmaster General Has Operators' Plan to Study

WASHINGTON (D. C.)—Rumors of trades, counter-trades, gentlemen's agreements, lawsuits, "conspiracies in restraint of trade" and the like are circulating here regarding the private workings of the air mail and airline operators in their attempt to evolve the new air mail map desired by Postmaster General Brown. The committee of operators, headed by William P. MacCracken, Jr., of Western Air Express, has submitted its recommendations to Mr. Brown and as this is being written are awaiting his decision. It is not considered likely that he will accept in toto the report, which was not unanimous.

The principle bones of contention are the two new transcontinental lines—the one running from New York to Los Angeles via St. Louis, and the other from Atlanta to Los Angeles. That the Comptroller General will allow Mr. Brown to place the mail, should he so desire, on existing passenger lines along these routes is gravely doubted. The chances strongly favor the throwing open of these routes to bidding—which is, evidently, the end against which many of the operators assembled in Washington are working. As a $1,000,000 bond is required for transcontinental routes only the strongest companies will be able to compete. Should bids be called for on these routes Western Air Express, Boeing, Transcontinental Air Transport-Maddux, and The Aviation Corp., are expected to submit offers.

Tentative Agreement Reached

However, a tentative allocation of the mail to passenger lines along these routes is believed to have been made by mutual agreement among the operators. Under this arrangement the mail on the new central transcontinental line would be divided up among three companies. From Los Angeles to Kansas City, or possibly as far east as St. Louis, the mail would be conveyed by Western Air. From there to Pittsburg T.A.T.-Maddux would carry it. It is considered likely that the Post Office Department, should this non-bidding arrangement be possible at all, would give the mail from Pittsburg to New York to Pittsburg Aviation Industries. Universal has indicated, it is believed, that it will surrender to T.A.T.-Maddux between Kansas City and St. Louis, if absolutely necessary to reach an agreement.

On the southern transcontinental the possibility looms of litigation which might disrupt the whole map. The area in which the most trouble is likely to occur is that part of the line between Atlanta and Ft. Worth-Dallas. Since the first of January daily service has been maintained between Birmingham and Dallas by Delta. Within the last few days their line has been carried into Atlanta. By July 1 of this year it will have fulfilled the 6 mo. daily service requirement of the Watres Bill. it considers that it has pioneered that section of the country and is therefore entitled to carry the transcontinental mail over it.

But Eastern Air, which bought out Pitcairn, wants an extension of its line from Atlanta in to Ft. Worth, we are reliably informed. Operators who began flying long ago do not consider Delta in the class of the pioneers whose interests the Watres Bill was originally designed to protect. Neither do they so consider Eastern, but it is understood that they are backing its claim to an extension. Should one be granted, and Delta take the case into court as many believe it would, all the extensions on the new map would be jeopardized. Whatever steps Delta may be considering, it is publicly pinning its faith on the expectation that the Postmaster General will recognize its equities as a pioneer. The western section of this line would be handled by Southern Air

(*Concluded on page* 1237)

Air Ferries Gets Fokker Amphibion

NEW YORK (N. Y.)—The Fokker Aircraft Corp. office here has announced that Air Ferries, Ltd., of San Francisco has bought a Fokker amphibion for use on its line and expects to buy more as needed by the demands of the service. This machine is a monoplane with wheels adjustable on a flying boat hull. It is powered with either a Hornet B or a Cyclone.

N.E.W. Increases Schedule

SPRINGFIELD (MASS.)—New England & Western Transportation Co., has announced a new schedule effective June 16. Planes leave Springfield for New York at 8 a.m., 10:30 a.m. and 3:15 p.m. A stop is made at Hartford 30 min. later, but Bridgeport is omitted. Running time to New York is 90 min. Return trips leave New York at 9:40 a.m., 1:15 p.m. and 5 p.m. Changes in connections give Boston a through 3-hr. service to New York via Springfield, leaving Boston at 9 a.m. and 1:15 p.m. Boston planes also run through to Albany via Springfield leaving Boston at 9 a.m. and 1:15 p.m. and arriving at Albany 2 hr. later.

Rate Increases Announced by Lines

Average of $.07 Per Mile Adopted by Several

NEW YORK (N. Y.)—Out of the many recent rumors that airline fares would be increased about this time, came the announcement from T.A.T.-Maddux that effective June 15, fares on its service would be increased to $.07 per mile. Since the drastic cut in rates Jan. 14, the rate has been $.06 per mile for the transcontinental service and $.05 per mile for the intermediate service.

Close on the heals of this announcement came the news that Southwest Air Fast Express, with headquarters at Tulsa, had decided to increase its rates to $.07 per mile from about $.05½ per mile, effective also on June 15. It was this company which late last year, under the leadership of Erle P. Halliburton, president and general manager, took the initiative in the drastic rate cutting, which spread rapidly in the following weeks to practically every company.

On Monday, June 16, American Airways declared its intention to follow the example set by these other companies and charge fares on the basis of $.07 per mile, effective July 1. This, also, is a jump from a rate of $.05½ per mile. Since American Airways includes such operating companies as Universal, Southern Air Transport, Colonial, Embry-Riddle and Interstate Airlines, this change covers a wide territory. Colonial's fare between New York and Boston will continue on the basis of $.08½ per mile.

Traffic Drop Not Expected

The companies do not anticipate that this rise in rates will effect the volume of traffic to any great extent. They express belief that the "Fare not Fear" theory has been well tested, that the higher fares will continue to be attractive since they are not as high as before the original cuts, that the habit of dependence on air travel has been developed satisfactorily and that the increased traffic incident to the summer season merits charging slightly higher fares.

Operating at the former low rates meant a considerable financial loss and it is expected that this change will enable the companies to come closer to breaking even. The conditions of the Watres Bill and the development of the habit of using the planes for travel are considered certain to be of great assistance to the operators in their finances.

The T.A.T.-Maddux fare between here and Los Angeles thus will be $175.43.

(*Concluded on page* 1238)

Report on New Device For Measuring Ceilings

WASHINGTON (D. C.)—A device by which the height of ceilings can be measured at night has been developed by Dr. Charles F. Marvin, Chief of the United States Weather Bureau.

By using the trigonometrical method employed by engineers in calculating the height of mountains Dr. Marvin has developed a light portable apparatus which, it is believed, will give exceedingly accurate results.

Trials of it have been going on at Bolling Field for some time and have been so encouraging that arrangements are now being made for the manufacture of a limited number of these "clineometers" to be experimented with at Weather Bureau stations.

Only two pieces of equipment are needed—the clineometer and an ordinary searchlight. The clineometer consists of a tube 9 in. long and 3 in. in diameter. At one end there is an eyepiece

Dr. Charles F. Marvin

and at the other a set of cross wires. No lenses are used in the apparatus. A penduium, protected from the wind by two plates, hangs on a pivot from the front-sight end of the tube. Beneath it is a scale showing the degrees of angle at which the tube is raised.

The searchlight is thrown either vertically or at a known angle on the clouds; then the man handling the clineometer walks some distance from the light and raises the tube until it is focussed on the spot of light on the cloud. The pendulum marking the degree of angle is then clamped in its position by a hand screw. On the side of the plate protecting the pendulum from wind are two scales—one in feet and the other in degrees of arc.

When the operator always takes his readings from a definite position determined in relation to the position of the searchlight he can read the height of the ceiling directly on the feet scale. But, when he varies his position he must take the pendulum reading by the degree-of-arc scale and get the ceiling height by consulting a table.

A greater distance between the observer and the searchlight is needed for triangulation when the clouds are high. Exactly what distance is best is one of the points to be determined in the work soon to commence with the experimental sets. Good results seem to follow now when a distance of about 500 ft. is established between the two ground points.

The greatest value of the present apparatus is expected to be realized in determining ceilings when clouds extend as low as 500 or 300 ft., according to Dr. Marvin's report.

N.A.T. Plans Move to Newark

CHICAGO (ILL.) — National Air Transport has announced at its offices at the municipal airport here that arrangements have been completed with the City of Newark, N. J., by which the long-standing effort of the latter to have the transportation company transfer its eastern terminal from Hadley Field to Newark will be realized. This transfer cannot take place before fall, however, upon completion of an N.A.T. hangar now under construction. Runways are to be further extended, also, before the change will be made. The hangar is to measure 145 ft. sq. and will house offices, shops, pilot quarters and radio rooms, etc.

Air Mail Traffic Continues Increase

WASHINGTON (D. C.)—Air mail carried by the domestic contractors during May increased 15,662 lb. over the volume for April. The total for the month of May was 687,053 lb. as compared with 671,391 for April and 587,471 lb. for May a year ago. There has been a steady gain in poundage each month this year. In December Christmas air mail brought the total to 618,809 lb. The daily average during May was 26,425 lb.

	Mileage	Pounds, 1930 March	April	May
Boston-New York	192	9,465	11,074	12,254
Chicago-St. Louis	278	4,211	4,719	5,257
Chicago-Dallas...	1,059	35,794	38,989	37,945
S't Lake-Los Ang.	600	71,215	72,327	75,162
Salt Lake-Pasco...	530	22,002	23,251	25,092
Seattle-Los Ang...	1,141	20,396	21,659	22,129
Chicago-Minn....	503	19,826	18,876	19,942
Cleveland-Pitts...	123	4,545	5,399	6,117
Cheyenne-Pueblo.	199	6,594	4,635	7,707
Cleveland-L'ville	345	5,408	6,675	7,822
New York-Chi'go	718	132,680	117,121	142,396
Chicago-San Fran.	1,932	155,322	190,521	159,540
New York-Atl'nta	763	34,916	37,572	41,495
Albany-Cleveland	416	5,068	5,699	6,097
Dallas-Galveston	320	3,409	3,341	3,403
Dallas-Br'wnsv'le	529	7,618	7,225	7,225
Atlanta-New Orl.	483	8,292	9,292	11,066
Chicago-Cin'ti...	270	4,965	6,740	6,750
Atlanta-Miami...	736	13,957	17,341	16,571
Great Falls-S't L.	489	4,528	4,696	4,963
Chicago-Bay City	712	14,992	16,686	16,547
St. Louis-Omaha.	403	13,514	14,741	15,828
N' Orl'ns-H'uston	319	4,455	3,960	4,947
Chicago-Atlanta..	768	8,507	12,667	12,197
Pasco-Seattle....	449	13,649	16,185	18,601
Total.....		625,328	671,391	687,053

Increase—15,662 lb.
Daily average—26,425 lb. for May.

Uncertainty Marks New Air Map

(*Continued from page* 1236) ..

Transport, from Dallas to Los Angeles.

Extensions which it is believed the Postmaster General will authorize are: C.A.M. 9, from Minneapolis to Winnipeg (Northwest Airways); C.A.M. 11, from Pittsburg to Washington to Norfolk (Clifford Ball); C.A.M. 12, from Pueblo to Ft. Worth-Dallas, and from Pueblo to El Paso (Western Air); C.A.M. 16, from Louisville to Ft. Worth-Dallas (Continental); C.A.M. 20, from Albany to Boston (Colonial Western); C.A.M. 23, straightening existing line by running from Atlanta to New Orleans via Montgomery (Gulf Coast Airways).

A line may be put in between Jacksonville and Greensburg, it is understood, but this will not eliminate the Greensburg-Atlanta-Jacksonville section of Eastern Air Transport. It is also considered possible, although not likely, that U. S. Airways may get the mail between Denver and Kansas City or St. Louis, depending on the routing of the central transcontinental. No mail will be put on the T.A.T.-Maddux line, as it parallels the Boeing mail line, and the Postmaster General will not allow the carriage of mail over closely paralleling routes, it is reported.

S.A.F.E. Plan Doubtful

There is some likelihood that S.A.F.E. may be granted the mail concession between St. Louis and Tulsa, but it is understood not to have received much co-operation from the other operators in asking for more. Feeling exists to the effect that if Mr. Halliburton of S.A.F.E. had not influenced Representative Kelly in his amendment of the Watres bill the present situation would not exist. In the original bill the Postmaster General was granted the authority to place small quantities of mail on whatever passenger lines he deemed necessary, to supplement the mail service and to give the struggling pioneer lines enough assistance to tide them over.

As amended, this provision for the aid of the passenger lines has been so restricted that mail can be placed on but few of them. Of several lines which may be running between two points, only one can carry mail. Naturally, those lines which do not have the mail subsidy are going to be put at a disadvantage with their competitors. For this reason the eligible passenger operators have gotten together and tried to make up an air mail map, by trading routes between themselves, which will work the least hardship and give the greatest assistance to all of them. This map is now before the Postmaster General. It is believed that he will not accept it in entirety as desired, but will use it in evolving a map of his own, on which the routes and extensions above noted probably will be incorporated. In the meantime the transport companies are quite anxious over the final results.

AIRPORT CONSTRUCTION PROJECTS

West

THE SEATTLE NAVAL AIR BASE at Sand Point, Wash., is to be enlarged by 30 acres, as a result of the recent approval by the Senate naval committee, under the provisions of a bill by Senator Jones of $50,000 to be spent for the additional land. Seventy acres more are needed, it is contended by the Municipal League. The full 100-acre tract is appraised at $237,500, it is reported.

The Department of Commerce has applied to San Diego for a lease to install a radio range beacon at Lindbergh Field. The four projected 50-ft. towers and other equipment will cost about $25,000.

The Chamber of Commerce of Wenatchee, Wash., has voted $10,000 for improvements to Fancher Flying Field. Equipment for night operation is contemplated.

The San Jose (Calif.) Airport has been leased to Pacific Air Transport, which plans extensive improvements for the field, including new hangars and lighting equipment.

Construction of a 240-acre landing field has been begun on the George Seal ranch near Saratoga, Wyo. It is expected the field will be in condition for use about July 4.

Ground was broken at Curtiss-Wright-Reynolds Airport, Glenview, Ill., on June 15 for the grandstands and special buildings to be erected for use during the National Air Races.

County supervisors have awarded a contract for the erection of a reinforced concrete hangar to cost $18,896, at Fly Field, near Yuma, Ariz.

The Prescott (Ariz.) Kiwanis Club plans erection of a hangar, the installing of beacon and boundary lights, and a water and sewer system at Love Field.

Construction is soon to start at Tulsa Municipal Airport on a new administration building, to cost $150,000.

The County Airport at Yakima, Wash., is to have 32,000 gal. of oil spread on its runways.

Central

Chamberlin Field, Denison, Ia., is reported to be nearing completion. The port, which is named for Clarence Chamberlin, whose home is at Denison, and which is being constructed by the Weberg Airway Corp., comprises 55 acres and will have 3,000-ft. runways.

The Fairfax Airports, Inc., Kansas City, Kan., has let a $40,000 contract to the E. H. Lawton Construction Co., St. Joseph, Mo., for construction of 40x115 ft. terminal building at Rosencrans Field, St. Joseph.

Work on the new runways at the Omaha Municipal Airport is reported to be progressing rapidly. A new drainage ditch is a little less than half completed

Installation of flood and boundary lights at Bernard Field, Youngstown, Ohio, is reported to be nearly complete.

Ground is about to be broken at Wichita for construction of the new $150,000 municipal airport administration building.

East

Bettis Field, Pittsburgh, owned and operated by Curtiss-Wright, will shortly reach the stage of completion aimed at in its first improvement schedule. The port has been fenced and is to have three parking lots planned to accommodate about 1,500 cars.

The 600-acre Curtiss Field, Valley Stream, N. Y., has been rolled and planted with grass at an estimated cost of $50,000, and runways have been treated with oil, with the result that dust from the field has been reduced to a minimum.

A new airport has been completed at Milford, Pike County, Pa., and will be officially opened early in July. The field contains 155 acres, has a 60x100-ft. hangar, and complete shop equipment.

Construction of a three-story administration building at Bowles Airport, Springfield, Mass., will begin soon.

The new Curtiss-Wright Flying Service base at Baltimore was completed and opened recently.

South

At a public hearing held recently in Jacksonville, considerable interest was expressed in the project of enlarging the new Palm Park Field in South Jacksonville, by dredging the channel of the upper river and filling in the west side of the present field. A stenographic record of the hearing has been submitted to the War Department.

A new hangar has been built at Fort Worth (Tex.) Municipal Airport, and will shortly have floodlights installed on its roof. A radio range beacon, operating on 250 frequency, is also under construction there.

The Airport Commission of Laurel, Miss., is reported to have acquired two large fields adjacent to the municipal airport so that runways may be lengthened.

Work of grading runways on the Eureka Springs (Ark.) municipal landing field is progressing rapidly, and it is hoped the field will be ready for opening on July 4.

The airport now being established at Borger, Tex., contains 400 acres, not 60 acres, as was reported in the May 24 issue of AVIATION.

The Stateline Airport near Siloam Springs, Ark., has been leased by a local commercial club which has several improvements under way.

An emergency landing field has been established at Weatherford, Tex., on the proposed route of Bankhead Airways.

A hangar has been completed at the Andalusia (Ala.) Municipal Airport, and work of grading is now underway.

Lubbock, Tex., has voted an $80,000 bond issue and has purchased land for an airport.

Uvalde, Tex., has voted bonds for $10,000 for improving its airport.

East Rate Increases Announced

(*Continued from page* 1236)

as compared with $159.93 under the previous rate. The intermediate fares will be: Port Columbus to Indianapolis Airport $13; St. Louis, $29; Kansas City, $46; Wichita, $58; Waynoka, $66; Clovis, $82; Albuquerque, $95; Winslow, $110; Kingman, $126; San Francisco, $165, and Los Angeles, $144.

A conference of traffic officials of the company was held at Port Columbus June 11. Among those present were J. L. Maddux, president; T. B. Clement, general traffic manager; J. W. Brennan, eastern division traffic manager; H. W. Beck, western division traffic manager, and G. E. Everett, assistant to Clement. The line made a drastic cut in its rates Jan. 14 when passenger traffic was low.

Traffic on the company's lines increased again during May. The eighteen transports operated each day carried 5,474 persons 244,286 mi. as compared with 5,164 persons and 243,443 mi. in April. Since the first of January the company has carried 19,307 passengers and the planes have been flown 971,242 mi. A little more than half the traffic on May was in the eastern and the central western sections.

Truck Co. Plans Air Express

PHOENIX (ARIZ.)—Regular light package service by airplane to supplement its freight and trucking routes now operated is projected by the Los Angeles & Phoenix Express, according to an announcement by J. C. Matson, president. This firm operates 22 trucks in a fast express service between Los Angeles, Phoenix, Blythe, Tucson, Douglas, Globe, Ajo, Nogales, Prescott, Chicago and New York. Mr. Matson has purchased a Stearman biplane for his own personal transportation and flies regularly over his various routes, keeping in touch with his branch offices and with the trucks themselves through a dispatching system which keeps him constantly informed of the movements of all units. A. L. Warrender has been engaged as Mr. Matson's chief pilot and will assist in outlining the aerial freight service which is planned.

Long Beach Port Making Profit

LONG BEACH (CALIF.)—A recent report by W. J. Putnam, manager of the Long Beach Municipal Airport, indicates that the field is now on a dividend paying basis. This airport, most of which was purchased by the city at a price of $1,250 per acre, is within 5 mi. of the center of Long Beach. Income from hangar rentals and the sale of gasoline and oil are said to have made it possible to more than meet the cost of operating the field. The city recently dedicated the new commercial administration building, which incorporates a restaurant, waiting room, ticket office, and administration offices.

Continental Starts Chicago-Columbus Line

COLUMBUS (OHIO) — Columbus-Chicago passenger service was started by the Continental Airways, Inc. on June 9. Seven-place Travel Air cabin planes, powered with Wasps, are being used. The line will make connections at Port Columbus with trains of the Pennsylvania Railroad both morning and night. The fare between Columbus and Chicago, will be $22, at the rate of $.07 per mile. The total fare between New York and Chicago will be approximately $52, including Pullman accommodations.

Planes will stop at Dayton. Ernest H. Stork, of the City Engineering Department, Columbus, has been named district traffic agent here. C. A. McElvain is operations manager of the company, and W. G. Ferstel, general traffic manager. Planes will make the trip from Columbus to Chicago in 3 hr.

The schedule is as follows:

lv. 8:05 a.m.	Columbus	ar.	7:05 p.m.
ar. 10:25 a.m.	Chicago	lv.	2:45 p.m.

S.A.F.E. to Carry Smaller Loads

FORT WORTH (TEX.)—Notification has been received at the S.A.F.E. office here that during the summer Southwest Air Fast Express fourteen-place planes will carry only twelve passengers. Reduction of the number is a safety measure, taken because of the difficulty of landing with heavy load in the hot atmosphere. To date S.A.F.E. has never had a serious accident.

Columbus Traffic Forces Changes

COLUMBUS (OHIO)—Although less than a year old, the administration building at Port Columbus is declared to be too small to handle the traffic of the airlines using the port. Plans for building another chute and loading platform at the west end of the building and the removal of the "bull pen" to allow room for enlarging the concrete apron along the west side of the building, and enlargement of the ticket office to enable three ticket sellers to work, were formulated at a meeting held June 13, attended by Service Director Duffy, Council President Worley and a group of T. A. T.-Maddux and Continental Air Line officials. If traffic increases in the next year as it has in the past, it will be necessary to build a new wing on the administration building.

W.A.E. Changes Operations

LOS ANGELES (CALIF.)—Daily passenger service to Salt Lake City, and a later departure time from this city on its Los Angeles-Dallas line, were placed in effect June 1 by Western Air Express with the inauguration of the Los Angeles-San Diego air mail service. The daily passenger service provides accommodations on Monday to Salt Lake, which has not hitherto been available. Planes leaving at 7:35 a.m. will carry both mail and passengers while those leaving at 7 p.m. will carry mail only. The new departure hour for planes on the Los Angeles-Dallas division is 4:30 a.m. instead of 4:00 a.m. as before.

Three Hangars Completed at Wright Field

THE ELABORATE equipment at Wilbur Wright Field, Dayton, has been increased recently by the completion of three hangars and an office building. Hangars No. 1 and No. 2 are on the right and they are connected by the office building. The third hangar is at the left. All the buildings are of brick and steel. The larger hangars measure 311 x 90 ft. and the smaller one 290 x 90 ft. Cement aprons flank the buildings on all sides and sliding doors permit easy access. Each hangar may accomodate about 60 planes. More construction is planned.

Air Corps States Plan For Rockwell

WASHINGTON (D. C.)—A proposed compensation agreeable to the Army for its buildings on Rockwell Field, North Island, has at last been arrived at between the Army and Navy, Assistant Secretary of War for Aeronautics F. Trubee Davison revealed in the second hearing before the House Military Affairs Committee of the bill proposing the transfer of Army air activities from Rockwell Field to the San Francisco Bay area. Inability of the Army and Navy to agree on the amount of compensation for the Army's structures which would be taken over by the Navy has been one of the chief obstacles to the transfer. Now only the opposition of Representative Swing of the San Diego district appears to remain.

Overcrowding of North Island, now used by the Army, Navy and Marine Corps for flying activities, is the reason for the desired transfer. In the bill now pending $743,000 now authorized for appropriation at Rockwell Field would be transferred to a site in Alameda for the establishment of an Air Corps depot, and $803,000 now appropriated and $453,000 authorized for appropriation for Rockwell would be transferred to a Marin County site for a flying field.

More than 250 planes use the Navy base at North Island for the greater portion of the year, Commander John Towers, of the Navy Bureau of Aeronautics told the committee. A considerable number of collisions have resulted from this overcrowded condition, some of which have resulted in deaths, Commander Towers said.

T.A.C. Increases Service

DETROIT (MICH.)—Scheduled Sunday amphibion passenger service between Detroit and Cleveland was inaugurated by Thompson Aeronautical Corp. June 8. In line with the same policy Thompson plans to operate two round trip flights between the cities on all holidays, except Christmas, according to R. C. Marshall, vice-president and general manager. Until now the company has operated four round trips daily, except Sundays and holidays. The added schedule calls for the departure of one plane from each city every Sunday at 5 p.m. Holiday flights will be made at 11 a.m. and 5 p.m.

Women Using S.A.T. Planes

FORT WORTH (TEX.)—Thirty per cent of the passengers carried by Southern Air Transport during May were women. On two schedules, the plane was entirely filled with women. In May the company carried 2,207 passengers, flew 1,336 hr. and covered more than 135,000 mi. From 94.2 to 98 per cent of all scheduled trips were completed on various lines of the company, except the Fort Worth-Dallas-Houston line, on which the percentage of completed trips was 86.8 per cent.

Airway Briefs

International Airways Corp. plans to open a daily Kansas City-Brownsville, Tex., line this month, with stops at Oklahoma City, Dallas, Fort Worth, and San Antonio.

What Cheer Airport, Pawtucket, R. I., which recently changed management, was formally reopened June 21-22.

A passenger line between St. Louis and Jefferson City, Mo., with two round trips daily in Lockhead Vega planes, has been started under the direction of W. G. Shelton, Jr.

Night flying over National Parks Airways between Salt Lake City and Great Falls, Mont., was expected to begin June 1, with the completion of lighting installations and emergency fields.

It is rumored that Air Ferries, Ltd., operating amphibion service in San Francisco bay, may start a similar line between Staten Island and Battery Park, New York City.

Flares are being used to warn mail pilots on Canadian Colonial Airways of bad weather ahead, since the Department of Commerce weather broadcasting stations to be installed at New York, Albany, and Montreal, are not yet in use.

Francis Flying Service has begun operations at Houston (Tex.) Airport.

S.A.F.E. is said to be considering extension of its lines from Dallas to Houston, Tex., and possible inauguration of a new line from Houston to St. Louis via Little Rock, Ark., and Shreveport, La.

Frank A. Barry has opened a travel service bureau at 426 W. 8th St., Los Angeles, which gives special emphasis to aviation information.

Voters of Peoria, Ill., will decide July 15 whether or not to levy a special mill tax to provide a $100,000 fund for a municipal airport.

Gasoline sales at Lincoln (Neb.) Municipal Airport increased from 647 gal. in April to 1,519 gal. in May, and receipts were $349, for the city.

A weather reporting bureau is to be established at Love Field, Dallas, Tex., expanding present facilities.

Work on four emergency fields and ten beacon sites on the Brownsville-Kingsville section of the Brownsville-Houston (Tex.) airway has been completed.

S.A.T. Division of American Airways has inaugurated double plane service on the Dallas-San Antonio daily run.

Beaumont, Tex., has voted to issue $100,000 of airport bonds.

National Air Transport carried 14,598 lb. of express in addition to mail over its Chicago-Dallas and Chicago-New York routes during May.

Consolidated Air Lines, Inc., Oakland, Calif., plans to establish an airline between Sacramento and Montague, Calif., with stops at several points, as a feeder line for the regular coastal route.

T.A.T.-Maddux Air Lines and Pacific Steamship Company have made arrangements making it possible for passengers to fly from Los Angeles to San Francisco and proceed to Seattle by boat.

Skelly Oil Co. has erected an aerial billboard opposite the Municipal Airport at Tulsa, Okla.

Breadenridge, Tex., has voted to establish a municipal airport.

Resolutions approving a campaign to encourage the construction of municipal airports and extension of air mail routes were adopted by the delegates to the annual convention of the U. S. Junior Chamber of Commerce, held recently in Brooklyn, N. Y.

State Aviation Inspector Robert L. O'Brien has moved part of his staff and equipment from the Registry of Motor Vehicles to the Boston Airport.

Wabeno-Laona Airport, Wabeno, Wis., was formally opened June 1.

A sum of $2,000,000 was transferred by plane from Atlanta to Miami June 11 when there was a simultaneous run on several Miami banks.

Two-way radio communication was recently maintained between Captain Yancey's plane over the Panama Canal and the New York *Times* radio station in New York City.

Interstate Airlines, Inc., has moved its maintenance headquarters from Evansville, Ind., to Sky Harbor, Murphreesboro, Tenn. The company is planning to operate passenger service from Sky Harbor to Toronto, Canada, during the Canadian National Exhibition, Aug. 22-Sept. 6.

About 900 Florida towns will have their name marked in large letters on adjacent highways, under the direction of the Florida State Chamber of Commerce.

N. Y.-Washington Service Opens

NEW YORK (N. Y.)—Eastern Air Express, a subsidiary of the General Aero Corp., began a passenger service between this city and Washington June 12. A round trip will be made each day except Sunday. Grand Central Air Terminal at Jackson Heights and Hoover Field will be the local and Washington bases, respectively. A twin-engined seventeen-passenger Sikorsky land sesqui-plane is being used. The schedule is as follows:

Lv. 9:30 a.m.	New York	Ar. 6:15 p.m.
Ar. 11:45 a.m.	Washington	Lv. 4 p.m.

Gliding Field at Cleveland

CLEVELAND (OHIO) — Another "gliderport" has been established near Cleveland. It has been named Missbach Gliderport in honor of the owner of the property on which it is located and is almost ideal for primary and advanced gliding. Facilities for soaring may be developed.

Larger Colonial Crew At Boston Requested

BOSTON (MASS.) — Colonial Air Transport continues to run capacity and extra section trips between Boston and New York and, meanwhile, officials are awaiting the report of Pratt & Whitney engineers who are examining the Wasp engine that caused the recent accident. According to Robert L. O'Brien, state supervisor of aviation, any determination of why the engine failed was prevented when the Ford plane landed in the harbor. Inspector O'Brien was present when the engine was pulled down at the Colonial hangar by Pratt & Whitney engineers. The first thought of the investigators was a question of faulty maintenance, but a careful checkup disclosed nothing to indicate any mechanical defects.

As the cylinders were full of water and the rest of the engine thoroughly drenched it was impossible to tell whether a drop of water in the gasoline was the cause or to find any indications of loading up. Statements from the passengers as to whether the engines were cleared revealed that about half of them thought Pilot Owen O'Connor had cleared them and of the other half several didn't notice and two said he did not. Inspector O'Brien still feels that the blame, if any, should be on the alleged failure of O'Connor to sufficiently clear the engines.

In spite of the fact that this accident had nothing to do with poor maintenance, Inspector O'Brien feels that the size of the mechanical force employed by Colonial at Boston is insufficient for safe operation and he informed the correspondent for AVIATION that he intends to write a letter to The Aviation Corp. protesting this condition and that if this fails to bring results he will see whether he has any legal means of closing down their operations until they do. Capt. Albert L. Edson, airport superintendent, had already protested Colonial's maintenance before the crash.

Okla. City's Bond Issue Valid

OKLAHOMA CITY (OKLA.)—The attorney-general of Oklahoma has approved Oklahoma City's $425,000 airport bond issue which has been in litigation since it was voted last year. City officials have started preliminary plans for improving the port. Actual construction work is to begin about July 1. New hangars, extension of the present field, equipment with lighting and radio and a passenger depot and pilot quarters will be built.

Award Made in Kansas City Crash

KANSAS CITY (MO.)—One of several suits growing out of the air crash January 27 at Fairfax Airport, in which five persons were killed, was settled June 5 in the Wyandotte County district court. A judgment for $5,000 was awarded Forest McKinnon, 9-year old son of C. R. McKinnon, Chicago.

FOREIGN ACTIVITIES

Australian Airlines Report Plans, Progress

MELBOURNE (AUSTRALIA)—During the first three months of operation (Jan. 1-March 31) of the unsubsidized Sydney-Brisbane daily service flown by Australian National Airways, Ltd., 1,244 paying passengers were carried, as well as 2,554 lb. of mail. The total mileage for 182 trips completed was 91,700, and regularity of service was 98.9 per cent. The company uses five three-engined Avro Tens, and a Metal Moth. There have been no accidents, and only one forced landing.

The Commonwealth Government has offered to renew for three years the contract subsidizing the Perth-Derby airline operated by West Australian Airways, Ltd., and plans are being made to extend the route to Wyndham. The company's Perth-Adelaide route is also to be extended to Sydney. This addition will take 8 hr., and will probably be flown in two days, to make connections. Fare will be about $60, including hotel accommodations at Hay, where the overnight stop will be made. When these services are started the company will be operating a little more than half way around the rim of the continent. Two fourteen-passenger Vickers "Viastra" planes have been ordered, and will be delivered in October. They will be used on the new line.

F.A.I. Award to Costes

PARIS (FRANCE)—At the annual meeting of the Federation Aeronautique Internationale, June 8-15, it was announced that the society's medal for 1929 would be awarded to Capt. Dieudonne Costes, in recognition of his achievement in breaking the world's distance record and several international records. In selecting the achievements of Captain Costes as the most noteworthy, the committee gave careful consideration to the accomplishments of Rear Admiral Byrd, Iglesias and Jiminez, Dr. Eckener, and the German glider pilot, Kronfeld.

Belgium Plans Light Plane Meet

BRUSSELS (BELGIUM) — Royal Belgian Aero Club is organizing a competition for light planes (Concours International d'Ovions Legers et de Tourisme) to be held at Bruxelles-Evere airport Sept. 17-21. This is the eighth annual contest of this type. A cup is offered by the King of Belgium, and prizes include $560 for the winner and a special prize of $280 for very small planes. Entries accompanied by a fee of $28, will be received until Sept. 7. The fee will be refunded to contestants actually entering the competition. The competition will include a cross-country race.

German Plane Sets International Records

SPEED and altitude marks made by the D.18, shown above, have been homologated as international records in the first category by the F.A.I. On April 21, pilot Voigt reached a height of 24,819 ft., and two days later pilot Neininger used the same plane in attaining a speed of 214.848 km. per hr. (134.3 m.p.h.) for 100 km. The engine is a 100 hp. Armstrong Siddeley Genet Major, while the plane was designed and built by aviation students at Darmstadt University. Pilot Voigt is shown at the left in this picture.

New Line in Guatemala Gets Exclusive Contract

GUATEMALA CITY (GUATEMALA)—Contract for carrying all Guatemalan air mail for 10 yr. has been awarded to Central American Aviation Corp., Ltd., formed here recently under the presidency of W. Hodkinson. Three routes will be operated, as follows: Guatemala City-Lake Flores; Guatemala City - Quitzaltenango - Retalhuleu; and Guatemala City-Port Barrios. Eventually connections will be made with steamships on both coasts. Operations were started June 4 with one transport plane, and others will be added as fast as they are completed. A Fleet trainer and a Travel Air biplane are also used for contact work. The transports are seven-passenger sequi-planes built by Hodkinson Aircraft, Inc., Glendale, Calif. They use three Challenger engines.

Central American Aviation Corp. has also received an exclusive contract for distribution of the products of Union Oil Co. of Calif. in Guatemala, Salvador, Honduras, and Nicaragua, under the direction of Roy Harding. Roderick Burnham, who has been in charge of foreign exploration work for Union Oil Co. for 10 yr. is executive vice-president of the new airline company, and Daniel Ellis, formerly in charge of operations for Pickwick-Latin American Lines, is vice-president and operations manager. J. Irigoyen, Guatemalan banker, is the third vice-president.

Fliers Land Free at Hanworth

LONDON (ENGLAND)—No fees are to be charged hereafter for privately-owned planes landing at Hanworth, the London airport operated by National Flying Services, Ltd. Flying visitors will be made honorary members of the Club for one day. The company expresses its regret that this privilege cannot be extended at other airports where it operates, since they are municipally owned and the charging of landing fees to non-members of N.F.S. flying clubs is compulsory.

Farman Lines Report Growth

PARIS (FRANCE) — Farman Airlines now comprises seven routes, on which 34 planes are used, according to a recent company statement. In 1929, total miles flown was 703,786, as compared with 190,760 in 1925. During the 5-yr. period, regularity has been improved from 68 per cent to 94.8 per cent, while the number of passengers carried has increased from 2,307 to 8,860, and the amount of mail and freight from 154,561 lb. to 1,080,170 lb.

Foreign Briefs

The Fokker "Spider" used on several famous flights by the Duchess of Bedford and C. D. Barnard, was fitted with Bendix wheel brakes before the recent flight from London to Cape Town and return. They were instrumental in preventing a crash when a forced landing was made in a narrow pass in Jugoslavia.

Among the supplies and equipment used by Miss Amy Johnson on her solo flight from London to Australia were Shell gasoline, Wakefield Castrol, K.L.G. sparkplugs, B.T.H. magnetos, Husun Aperiodic compass, and an Irvin airchute. The Moth plane itself had been used in July, 1928, by Capt. Hubert Broad in making an unofficial duration record of 24 hr.

Proposals for a direct airline between Manchester, Liverpool, and Birmingham, England, and continental Europe are being considered by officials of the three cities, which have indicated willingness to provide a subsidy to aid in establishing it.

An air meet was held by the Victorian section of the Australian Aero Club May 24, and by the South Australian section March 22. The Aero Club of New South Wales plans to hold its annual derby October 25.

Navarro Safety Aircraft Co., Ltd., Heston, England, is building a semi-cantilever three-place monoplane to be powered with three A.B.C. Scorpion engines, giving a total of about 110 hp. It has several features such as turned-up wingtips, differential elevators, a rudder air brake, and unusual visibility.

The British firm of Bolton & Paul, Ltd., is offering the "Phoenix," a two-place parasol monoplane with 75 hp. Salmson engine.

A fund has been established in Czechoslovakia to provide an annual scholarship of $300 to enable some properly qualified person to pursue the study of aeronautics in some foreign university. The fund was founded in honor of President Masaryk.

The Skoda company of Prague, Czechoslovakia, has built to the design of Major Kozeluh a four-cylinder horizontally opposed engine, developing 45 hp. at 3,000 r.p.m. The propeller is run from the camshaft, giving a reduction of two to one. Total weight is 110 lb.

The Dornier works at Friedrichshafen has recent completed the Do.K, a high-wing cabin monoplane with two Gnome-Rhone Titan engines in tandem under each wing. It has a new type of combination landing gear, engine mount, and wing bracing.

An auxiliary airfoil invented by M. Constantin and said to diminish the hazards of stalling is being tested on a Farman F.71 biplane at Toussus-Le Noble Airport, France.

Air Service, a subsidiary of the Farman company offering aerial taxi flying, is advertising week-ends by air, taking passengers to resorts Saturday noon and bringing them back to Paris Sunday night. The cost is about $.125 per mile.

Over 300 planes participated in the French national air fete at Vincennes June 8, and the number of spectators was estimated at 300,000. On the same day, a large demonstration of military flying was held in Rome.

Mme. Maryse Bastie, former holder of the woman's endurance record, failed in an attempt to regain it at Le Bourget June 10, as her plane ran out of gasoline after 22 hr. 27 min. in the air.

The Prince of Wales and the Duke of York are both now qualified pilots, Prince George is taking flight training, and the other son of King George V, the Duke of Gloucester, uses an airplane for much of his traveling.

Frederick Henry Royce, founder, director, and chief engineer of Rolls Royce, Ltd., has been awarded a baronetcy.

Following the winning of his prize for the first Indian to fly solo from India to London, the Aga Khan has offered a prize of $2,500 for the first Indian to fly from any point in India to Capetown within four weeks from the date of starting.

A Swiss inventor has made successful tests with a new type of parachute which has a pilot chute within the shroud lines of the main canopy, with a hole in the top so that it can act as a funnel to fill the larger chute.

General Graziani, vice-Governor of Cyrenaica, Italy, has organized a circuit court which travels around the province by plane.

The Jupiter engine is now produced under license in seventeen different countries. The English Bristol company turns out twelve of these engines weekly.

Air Vice-Marshal Sir John Miles Steel has been appointed to command the Royal Air Force in India at the end of February, 1931, when Air Marshal Sir William G. H. Salmond will terminate his period of appointment. Air Vice-Marshal E. R. Ludlow-Hewitt, now Commandant of the R.A.F. Staff College, will become Air Officer Commanding in Iraq next October. Air Commodore P. B. Joubert de la Ferte will succeed him as Commandant of the Staff College.

The Junkers G. 38, four-engined monoplane, has received official German approval as a freight-carrier.

More than 1,000 hr. of flying without an accident by members of the Singapore light seaplane club is reported by the U. S. Department of Commerce representative.

Pope Pius XI has recommended use of airlines by church dignitaries as a means of making possible more frequent visits to Rome without undue loss of time.

Official dedication of Valbuena Flying Field, Mexico's Central Civil Airport, will take place Sept. 16.

The concession to Enrique Schondube for operation of Vera Cruz-Progreso and Vera Cruz-Tampico airlines will be withdrawn if service is not inaugurated within six weeks.

Students of six Tokio universities recently formed the Japanese Students Federation of Aviation.

Reduce Mexican Air Postage

MEXICO CITY (MEXICO)—As a result of last year's deficit of $10,000 incurred by the air mail service, officials of the Ministry of Communications and Public Works and the Post Office Department are holding a series of conferences to work out methods of making the service more profitable. Air mail postage to points in Mexico and the United States was recently reduced from $.175 to $.10 per oz. of first class mail, and reductions for other classes are being considered. During 1929, 115,275 lb. of mail were carried on Mexican airlines, yielding a revenue of $212,691. The payment to aviation companies was $223,090. Greatest volume was carried over the Mexico City-Brownsville, Tex. route flown by the Mexican division of Pan American Airways, and the same company also operates the Vera Cruz-Merida line which is second in traffic.

Test Siemens-Halske Engine

BERLIN (GERMANY)—Comprehensive tests supervised by Deutschen Versuchsaustalt für Luftfahrt e.V. over a period of two months were passed successfully by the new Siemens-Halske 9-cyl. radial aircraft engine, model SH.20. The horsepower developed varied from 478 to a maximum of 591.78 under different conditions of load and endurance, and the company rating is 500-580 hp. with top speed of 1,900 r.p.m. The engine, which does not use reduction gears, weighs 881.8 lb., giving a wt./hp. of 1.488 lb. The piston displacement is 213.5 cu.in., as compared with 191 cu.in. for the Bristol Jupiter and 186 cu.in. for the Pratt & Whitney Hornet. A more complete description of this engine will appear in a later issue of AVIATION.

Plan New Peruvian Line

LIMA (PERU)—Two Boeing 40-B-4 mail and passenger planes have been received here for use on the Cajamarca-Moyobamba service which is to be inaugurated soon by Peruvian Naval Airlines. The new route will eventually be extended to Iquitos on the Maranon River in the Amazon region, supplementing the Lima-Iquitos service which has been in operation for some time. In conjunction with the railroad from the port of Pacasmayo to Cajamarca, through service will be provided from Iquitos to the Pacific Coast, and the trip will be made in from 30 to 36 hr. Landplanes will be used as far as Chachapoyas, from which point seaplanes will operate over the river to the end of the line.

Lord Thomson Gives British Airways Data

LONDON (ENGLAND) — Comparative subsidy figures for various European nations were given recently by Lord Thomson, Secretary of State for Air, during a debate in the House of Lords. The secretary said that in France 77 per cent of airline receipts is subsidy, in Germany 68 per cent, and in Great Britain only 50 per cent. The subsidy cost per mile of operation is about $4 in France, $2.25 in Germany, and $1.60 in Great Britain. In the latter country, the subsidy contribution to Imperial Airways now amounts to about $.80 per ton-mile.

In the course of his speech, Lord Thomson predicted that the central African airway would be in operation as far as the Great Lakes by the end of this year, and would reach Cape Town by the spring of 1931. He felt, however, that the extension of the London-Karachi line to Australia would not be in operation before 1932. The Air Ministry is also considering giving aid to Canadian companies or the Canadian Government in establishing airways on the western side of the Atlantic, possibly from Canada to South America. Finally, Lord Thomson urged the immediate building of an airship with gas capacity of 7,500,000 cu.ft., if the forthcoming flights of R.100 and R.101 are successful.

Junkers Seaplane Sets Marks

BERLIN (GERMANY)—Several noteworthy performances were recorded recently by a Junkers Junior plane on floats, piloted by Captain Zimmerman. He reached an altitude of 18,696 ft. alone, and 15,416 ft. with a passenger. He also set a duration mark of 8 hr. 27 min., and attained a maximum speed of 101.8 m.p.h. Although this plane does not fall in a category recognized by the F.A.I., it is believed that these constitute unofficial international records for light seaplanes. The plane used had an 80 hp. Genet engine.

France Approves Welding

PARIS (FRANCE)—Welding has at last been approved for use by French aircraft manufacturers. It was prohibited as unsafe during the War, and until the present, attempts to persuade the Government to allow it have been futile. Permission was obtained, however, for experimental construction of a cantilever monoplane ten-passenger transport by Avions Villiers, using welded chrome-molybdenum steel for fuselage, landing gear, engine mount, and tail surfaces. Static tests have been successfully passed, and as a consequence, this form of construction will be permitted hereafter. The same company is now constructing a tri-engined transport with welded structure.

Segrave "Meteor" Has Novel Features

LONDON (ENGLAND) — Unusual interest has been evinced in the "Meteor," a cantilever low-wing cabin monoplane designed by Sir Henry Segrave, the first example of which has just been completed. It is powered with two inverted Gipsy engines placed in the wings, and is designed to fly on either one. Unusual visibility is secured by having the sides and front of the cabin entirely of glass. A streamlined nose extends out from the cabin ahead of the wing, giving the fuselage as a whole a fairly close approximation to streamline form. It was built by Saunders-Roe, Ltd., for Aircraft Investment Corp., Ltd. According to reports, production models will also be built by the Blackburn Co., in which the Aircraft Investment Corp. is also financially interested.

The "Meteor" is 28 ft. long, 7.5 ft. high, and has a span of 39.5 ft. With a designed pay-load of 510 lb., it carries three passengers and pilot with an endurance of 4 hr. The gross weight is 2,750 lb., wing-loading 10.93 lb./sq.ft., and power-loading 11.31 lb./hp. Estimated performance figures are as follows: top speed, 140 m.p.h.; cruising speed, 125 m.p.h.; stalling speed, 50 m.p.h.; ceiling, 17,000 ft. Prices announced are $11,500 for the standard model and $12,875 for the de luxe model. Extensive tests of the new machine are now being undertaken.

[After this story was written, word was received of the tragic death of Major Sir Henry Segrave when his speedboat, "Miss England," turned over after establishing a new World's record of nearly 100 m.p.h.—Ed.]

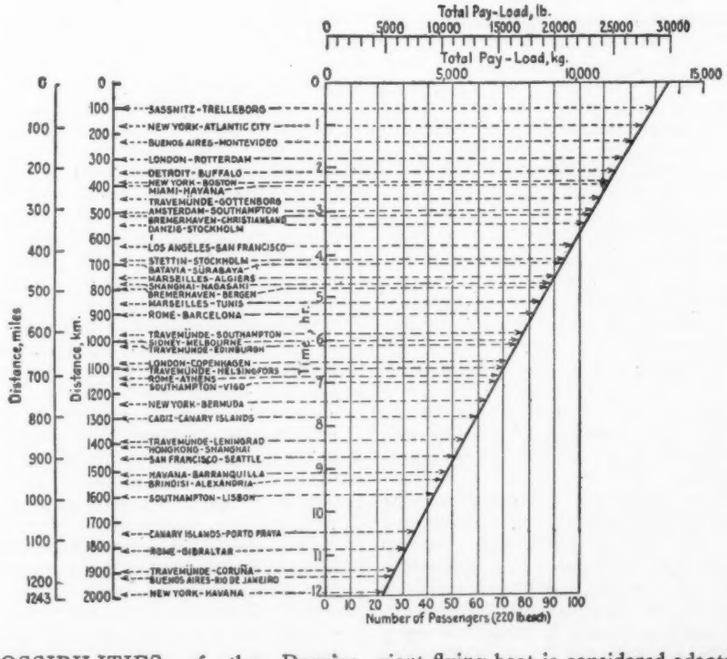
Agree on Europe-Congo Line

BRUSSELS (BELGIUM)—A convention for co-operative establishment of an airline to connect Belgium and France with the Congo and central Africa has just been signed here by representatives of the two governments. According to the agreement, which will run for 10 yr. with option of extension, the line will be run alternately by French and Belgian companies, the profits to be divided equally. S.A.B.E.N.A. will represent the Belgian Government; the French representative has not yet been selected, and it is possible that for the present the African Air Force may be designated, instead of a private firm. Weekly service is to be inaugurated before the end of the summer.

Start Danzig-Bucharest Line

WARSAW (POLAND)—During this month a new airline is to be opened between Danzig and Bucharest by Polskie Linje Lotnicze Lot. The service will be three times per week, and the 1,000 mi. will be covered in one day. Fokker F-7-B three-engined planes, manufactured in Poland under license, will be used.

Commercial Possibilities of the Do.X



POSSIBILITIES of the Dornier Do.X in regular commercial service are shown in the above chart, presenting data which was recently compiled and made public by Dr. Dornier. The giant flying boat is considered adaptable to use on any of the routes indicated, with ability to carry passengers and pay-load as shown in addition to fuel sufficient to provide a margin of safety.

WHAT OUR *Readers Say*

Good Flyers and Instructors

To THE EDITOR:

The editorial on learning and on teaching flying [in AVIATION for April 12, 1930] strikes a sympathetic note in one who has served in the capacity of principal of a flying school. Not by any means are all good flyers capable instructors.

While I am reluctant to subscribe to the thought that aviators as a class are temperamental—would at any rate deplore imbuing them with that idea—yet, just as the specialist in any line has his particular complex, so has the aviator, and so also has the instructor in any specialty. When, then, we admix the complex of the flyer and that of the instructor, we would do well to pick our man with all possible care.

It is my observation that both instructors and flyers are *born*, that what they *learn* is how to put their natural talents to use. I have no doubt that you have seen not a few men who are quite out of place in the educational world, just as we find so many would-be flyers who simply cannot fly. The former may continue to occupy places for which they are unsuited, but the latter must per force be rejected.

So, it is that, after subjecting the flyer to most exacting tests, we must subject him to further tests in order to learn of and then develop his ability to impart knowledge. This greatly reduces the number of men available to teach flying.

To date we have been so hard pressed to qualify enough flyers that we have had to accept well nigh any flyer as an instructor. Let us hope that with the development of safer planes more born instructors will become flyers and thereby increase the available supply of instructor-flyers.

While it is very true that general and technical education is a most valuable asset to the instructor and to the flyer, yet to neither is it indispensable. There are good instructors among enlisted flyers of limited education just as there are poor ones among officers who have graduated from colleges, from technical schools or from the Naval Academy. By which I would repeat that, in my humble opinion, the ability to teach is a natural gift, to be developed in him who is so fortunate as to be possessed of it, just as is the case with ability to fly.

I have had the thought, too, that, by reason of their talent for imparting knowledge, certain newly graduated flyers would be excellent ones to retain as instructors. The mental processes through which they have just passed in developing ability to fly, being fresh in mind, would be of very real value.

BROOKS UPHAM.

[Admiral Upham, just appointed as chief of the Bureau of Navigation to superintend all the Navy's personnel activities, was for nearly three years in command of the Navy's flight training base at Pensacola. Few men have had an opportunity of seeing instructors and students in larger numbers or of more variable qualities of personality.—Ed.]

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Accidents

To THE EDITOR:

I have read with considerable pleasure the article on Aircraft Accidents by Pendleton Edgar, chairman, Accident Board, Aeronautics Branch Department of Commerce, especially in reference to safety measures in the air and the methods used in analyzing crash causes. I have read with equal pleasure your editorial comments on publicity to be given in cases of air accidents. In one or two cases I have read in the current press extremely caustic criticism of the Bureau of Commerce for apparent reticence in divulging to the press facts and findings in major aircraft accidents.

I have personally been for some years particularly concerned with the general condition of air safety and feel that the Bureau of Commerce is approaching this question in a correct manner, and that considerable reticence is absolutely required in cases of this kind until the "true cause of accident" is definitely established. First conclusions do not go!

Findings of investigations should undoubtedly be released for publication after thorough and complete investigation.

It is particularly pleasing to note that crashes due to material failures have in the last five years been reduced over fifty per cent. These figures are more than borne out by analysis of nine years of operation in the military services. At first sight, the increase percentage in crashes due to pilot or supervisory errors is alarming, but viewed absolutely cold-bloodedly the condition is favorable. Today the analysis of underlying causes is complete and all crashes not due to weather, terrain, carelessness, disobedience or materiel, including design, must perforce be attributed to poor judgment, poor technique or lack of experience or supervision.

But all crashes due to poor judgment are by no means criminal in their nature, nor are they subject to condemnation. The time interval in emergencies in the air is such a brief period that due consideration of all conditions is not often possible and "snap judgment" is a sine qua non. Speaking personally, I have been in a crash due to faulty judgment. Immediately afterwards, I am confident that the same plane could have been taken into the air, under the same conditions and with the same personnel, and landed in spite of the trouble and without damage, but the fact is that, while there was faulty judgment displayed, it was the best judgment which could have been expected of the pilot at the time. Experience, of course, counts, but time in the air alone gives judgment, and we can and must expect a fairly high percentage of crashes due to errors in judgment. It is inherent with the present day design, but gradually safety devices are improving this condition.

A study of all crashes in a nine-year period brings out some astonishing data, especially with regards to apparent cyclic errors of judgment in trained pilots with time in the air and what might be termed inherent psychological dangerous pilots. The data is not as yet sufficient to safely draw up rules and regulations to eliminate such pilots, but is becoming indicative.

I have watched the operation of several commercial air lines over a considerable period of time, and there is no doubt at all that in certain individual cases there are flagrant violations of safety orders in flying, both in the attitude of flying and in plane handling. This, however, is a question of flight discipline which will be corrected if the people at large will report the circumstance to local commerce inspectors, giving time, date, location and number of the plane, but here again is a difficulty. Laymen, as a rule, and I say this advisedly from the results of numerous investigations of crashes which I have personally investigated, are totally incapable of giving any reliable evidence of the speed or altitude of a plane in flight prior to an accident. The maneuvers in the air are not understood or recognized, and to the lay mind, a "tail spin" is everything from a zoom to a simple wingover.

One improvement in ground maintenance could, I think, be made by the Bureau of Commerce. It involves publicity! I have seen innumerable defects found by inspectors in planes in operation from small private fields, repairs that were criminal and sometimes fatal. They were made in all innocence, but, nevertheless, displayed criminal ignorance. Would it not be

wise for the bureau to publish in the aircraft periodicals photographs of glowing defects in ground maintenance, accompanied by sketches or descriptions of correct methods of repair, mentioning no names or localities? The game is new, and amateurs are designing, building and repairing. Help them out, by giving examples of the faulty workmanship found in the field. In this game a little knowledge is a dangerous thing.

K. F. SMITH,
U. S. Naval Air Station,
San Diego, Calif.

[It is with special satisfaction that we are able to present the personal views of Commander Smith, formerly Chief of Staff to the Commander of the Battle Fleet Aircraft Squadron and now in charge of repair and maintenance work at the Naval Aircraft Station at San Diego. His letter speaks for itself, and we take occasion only to express the heartiest approval of the suggestion of unlimited publicity made in his last paragraph. It is one which the Department of Commerce could quite well take under consideration and act upon favorably, and we should be glad to co-operate in giving publicity to their analyses of dangerous situations, the personnel and locations involved being left in discreet anonymity, where they have been found to exist.—Ed.]

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Instruction for Instructors

TO THE EDITOR:

I read with interest your editorial on "Is flying learned or taught?" [In AVIATION for April 12, 1930.] We are very much in sympathy with your argument.

In order to ensure our students of the best possible instruction, this company organized from the first an instructors' school, and before we allowed any of our instructors to start with students they were required to take a course both in flying instruction and ground instruction at the instructors' school. The course given required approximately two weeks' time.

Each instructor was considered as a student during his training period, and very careful consideration was given not only to his flying ability, but to his ability to impart his knowledge successfully to others.

It is surprising how many pilots with numerous hours in the air were found unsatisfactory to act as flying instructors, and in cases of this sort the school definitely recommended that they be placed on flying work other than instruction. In other cases the school recommended that instructors be confined to primary work only, and every instructor going through the school was graded.

In order that our schools may be kept up to standard, we have one or two men from the instructors' school constantly circulating through our various bases, checking and re-checking instructors in their methods, in an effort to build up their technique, morale and ability to instruct.

We feel that in the long run this is a policy which will pay, and we thought you would be interested in getting the reactions of our company in respect to this very important subject.

C. S. JONES,
President,
Curtiss-Wright Flying Service.

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Colored Beacon Lights

1. I have read the interesting article by L. C. Porter entitled "Thirty Cent Protection for a Million Dollar Ship" appearing in the May 10 issue of AVIATION. I note the criticism in one of the paragraphs concerning the non-use of colored lights for airways beacons, the paragraph ending with the quotation "why?" This would be interesting reading if these were the facts. Every airways beacon established by the Department of Commerce utilizes colored lights and conveys a message of significance and meaning to the pilot. Red course lights are placed on airways beacons where no landing is possible. Every intermediate landing field carries a green course light. The course lights flash mileage numbers which identify their locations. The use of colored lights has been developed to the highest degree as may be ascertained by reference to the inclosures.

2. This appears to be another case of the blind leading the blind.

F. C. HINGSBURG,
Chief Engineer, Airways Div.,
Dept. of Commerce.

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Fog Penetration

I have read with much interest, Doctor S. H. Anderson's letter of May 10. I have for many years, given much thought to this question of flying in fog, and have made some study of spectral analysis, which has at least enabled me to understand in a measure what we have to do in making objects visible in a fog.

Now, it seems to me, in the first place, that no part can be greater than the whole of which it is a part. In other words, a red light, obtained in the ordinary way, by simply excluding a portion of the white light, cannot have a greater penetrating effect than the white light itself which contains all of the rays that we see as red, simply because the other rays have been filtered out. It seems to me, therefore, that the greatest hope of improving the state of the Art of flying in a fog lies either in learning in what way to utilize the infra red rays that have penetrated and do penetrate the fog, or some means of producing a light which will have greater intensity in the red than any light at present available.

This problem can, of course, be approached in two ways—either by increasing the total brilliancy of the light and thus increasing the red rays along with the rest, which merely means progressive improvement in our present searchlights, or the finding of some means of producing an extraordinarily brilliant light that shall have more power in the red and infra red than any searchlight that we have at present available or can make available by the same effort and expense.

I notice that the basis of Doctor Anderson's illumination tables is one-tenth of one per cent, from which I infer that he has found that the total illumination can be reduced to one-tenth of one per cent of that normal in broad daylight and still be visible to the naked eye.

His article does introduce a new suggestion into the problem in that he points out that it is not simply a question of the total light available for the sight of the observer, but, also, the proportion between the light that comes through the fog and the light that is reflected by the fog and, therefore, has an obscuring effect, and if he can find a practical method of greatly diminishing the light that the fog itself reflects to the eye, it will be very helpful even if he doesn't increase the total amount of light that penetrates the fog and reaches the eye. Very few people have any idea how enormously adaptable the eye is as to light sensitiveness. It is possible to read ordinary print by the light of the full moon. I have often done it myself. We always read print by full daylight. Now, the light of the sun under like atmospheric conditions is much more than 1,000 times as great as the light of the full moon, so that the scope of the eye runs through much more than 1,000 times maximum illumination as compared with minimum illumination and by bearing this fact in view, I am in hope that somebody will be ingenious enough to make a substantial advance in this extremely important art of seeing through a fog.

I wish to express my personal sense of gratitude to Doctor Anderson for his contribution to this difficult and important subject.

GODFREY L. CABOT.

[Past President, National Aeronautic Association.]

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Parasites

TO THE EDITOR:

As a reader of your magazine AVIATION for the past five years, I have never before been disturbed as I was over the article concerning the "Parasite on Aviation" published on page 412 in the March 1st issue.

My personal opinion of the writer is that he must have been born an

expert on aeronautical science—and other sciences—and must have studied them since cradle days and can't see any reason why others shouldn't have been so fortunate. Since I have been interested in aviation and all its branches in a practical way, I wonder if you would mind, if it is possible to do so, getting in touch with the author of the article and asking him to kindly step forward as I would like to inherit some of his ability. That is, of course, if the party is not too proud.

Do you think the aeronautically inclined public having the desire to enter the field should be condemned due to lack of aeronautical and other science? If so I would like to know for the benefit of myself as well as others.

If it is possible I would also greatly appreciate the name of the great genius who wrote the article on "Parasite on Aviation."

Hoping you will give this matter your kind attention, I remain

PHILIP MASI,
Portchester, N. Y.

[The editorial to which Mr. Masi refers of course bore not upon the efforts of sincere inventors with some knowledge of the field wherein they work, but only on the activities of financial sharpers with fraudulent projects or deluded inventors with hopelessly impossible ideas who seek financial support from the hard-earned savings of small investors. For our unfavorable opinion of those groups we have no apology to offer.—Ed.]

Editorial Comment

FROM THE DAILY PRESS

The Graf Zeppelin Departs

MOST PEOPLE in New York, one imagines, had an emotional reaction to the Graf Zeppelin when she flew over the city Monday night far different from what they had had on previous occasions. For one thing, she flew lower than she had ever flown before, so that we got a more vivid idea of her speed, and also of her power. The drumming of her engines, somehow, was a breath-taking thing to hear. But that was not all. She was not a Jumbo of the air this time, a mechanical curiosity obligingly circling this way and that, so that those on the ground might have a good look at her, and in some degree provoking the yawns that come after five minutes of looking at any curiosity. She was an authentic aerial liner, on her way, going somewhere, and giving the impression that she was too busy with that purpose to care whether those on the ground looked at her or not. Thus she seemed to have grown enormously in that importance which attaches to all transportation of a major sort. Express trains, ocean liners, even big sailing ships, all have this; they are exhilarating, and when one of them passes you, whether it is in the middle of the ocean or on the countryside, you have an impulse to shout, wave your handkerchief and blow kisses, even if you know nobody on board. And why? Probably because they are visibly bound for far places, away beyond the horizon; they are no little airplanes or automobiles, buzzing around within a hundred miles from home, but great bulks whose only conceivable reason for existence is to voyage to the distant land of everybody's dreams. And they come to life only when the lines are cast off and they start the journey.

It was this touch of magnificence that the Graf Zeppelin carried with her Monday night, and to judge from the remarks on the street, every spectator caught it. She has now taken her place as an institution, like the Europa, the Berengaria, and the Twentieth Century Limited. — NEW YORK WORLD.

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Jumping Puritans

IT HAS been suggested that somebody dress as a Puritan and, to give the rôle an up-to-date aspect, jump from a dirigible over Boston, as part of the Tercentenary program.

That is a lot of nonsense. It is worse than that; it is foolhardiness. There is nothing to be gained. Persons jump with parachutes only when necessary. They jump to test them. They jump to learn how to use them. They jump when they have to jump.

We suggest that if the plan is carried through, the man who makes the jump should be the man who suggested the stunt.—BOSTON TRAVELER.

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'Dependability' for 'Thrill'

IF AERONAUTICAL SCIENCE has brought a thrill to modern transportation, it is also well on the road toward discarding the thrill in favor of the more prosaic elements of safety, efficiency and timetable promptness. Arrival and departure of passenger planes no longer attract the curious-minded crowds they did a decade ago; attendance is even dropping off in the number of those greeting the Graf Zeppelin, which recently moored at Lakehurst after its sixth trans-Atlantic voyage.

Much as we might regret the passing of the excitement and enthusiasm aroused by long-distance flights, we should welcome the commonplace reality of aviation and matter-of-fact attitude toward air travel which obviously implies that it has become an accepted mode of transportation whose thrill is an emotional by-product no more important than the thrill experienced in taking a train or ocean liner.

Flying is no longer a fantastic and improbable experience, but an everyday actuality of the here-and-now. Such being the case, it is losing its questionable glamour and substituting for it a dependability whose lack of excitement can be easily excused. — MINNEAPOLIS STAR.

New Volumes

FOR THE SHELVES

Airport Designs

AMERICAN AIRPORT DESIGNS; *Taylor, Rogers & Bliss, Inc., New York City; 96 pp.; $3.00.*

UNDER THE ABOVE TITLE, the designs submitted in the Lehigh Airports Competition, which closed last fall, have been published in book form. It is divided in four sections: Prize winning designs, honorable mention designs, selected designs, and an analysis of designs. The latter is done by Archibald Black, president of Black & Bigelow, Inc., New York City. The leading designs have been reproduced and dominate the book while others have been reproduced because of the interesting suggestions which they incorporate. The book is essentially a collection of estimates of future aircraft terminal facilities and as such stands as an indicator of what lines the evolution of airports may follow.—CHARLES H. GALE, *Assistant Editor of* AVIATION.

Abstracts AND *Reviews*

World Aviation

AVIATION ATLAS; *Sixteen-page collection of maps and photographs prepared for the Gulf Refining Co., by Rand-McNally & Co.*

THE Gulf Refining Company of Pittsburgh is issuing to the aviation industry an aviation atlas prepared by Rand-McNally & Company. The sixteen pages of this atlas present a number of interesting features, amply illustrated and dealing with the high lights of aviation history, as well as the contemporary information.

Two pages are devoted to photographs and brief descriptions of 52 outstanding figures in the development of aeronautics from the very beginning to the present time. Photographs are shown also of lighter-than-air and heavier-than-air types from their earliest beginning. There is a chronological review of aviation history and a world's map showing the path of the most famous long-distance flights. Two interesting graphs present the trend of miles flown and air passengers carried in each of the leading aviation countries since 1929.

The air transport routes in North and South America are indicated on relief maps and there is an interesting map showing the relative size of the United States in point of time required to cover distance within the country to what it was before the air mail as under the present system was developed.

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Aileron Effect on Rolling

EFFECT OF VARIATION OF CHORD AND SPAN OF AILERONS ON ROLLING AND YAWING MOMENTS AT SEVERAL ANGLES OF PITCH, *by R. H. Heald, D. H. Strother, and B. H. Monish; N.A.C.A. Technical Report No. 343.*

TECHNICAL REPORT 298 described the results of an investigation of the rolling and yawing moments due to ailerons of various chords and spans on two airfoils having the Clark Y and U. S. A. 27 wing sections. This report covers the extension of the previous work to higher angles of attack.

The model had a 60-inch wing span with ailerons of span equal to 67 per cent of the wing semispan and chord equal to 20 and 30 per cent of the wing chord. The measurements were made at various angles of pitch but at zero angle of roll and yaw.

It was observed that the upward motion of the aileron was much more effective in producing rolling moments than was downward motion. Also, the upward displacements produced much smaller yawing moments than the downward displacements. For this reason it is urged that some means be found by which one aileron is raised while the other remains neutral. Development of the differential aileron system to give larger upward displacements for a given small downward displacement is very desirable.

No general relation could be found for the effect of variation of span and chord of ailerons for both wing sections at all angles of attack. It was noted however, that while one aileron of a given chord and span at a given angular displacement produced almost the same rolling and yawing moments on both wing sections, the usual combination of two ailerons gave a ratio of rolling moment to yawing moment from 1½ to 2 times as great on the U. S. A. 27 as it gave on the Clark Y section.

New Patents

Retractable Landing Gear

1,759,652. Grover Loening, New York, N. Y. Filed June 29, 1929. Serial No. 374,732.

A RETRACTABLE landing gear with a highly efficient shock absorbing element in the main folding strut is covered by this patent. Two types of landing gear are covered. The first of these retracts the wheels into wells provided within the float and automatically closes a door after the wheel. The second type folds the wheels into a position approximately 45 deg. above the center line of the float. In both instances it is the main strut which folds and this strut automatically locks when lowered into position for use. The shock absorbing element in each case is rubber compression rings.

On the landing gear which folds within the pontoon the upward and downward motion of the wheel opens and closes a small door in the bottom of the float. Thus, when the wheel is completely retracted, the lower surface is smooth and unbroken by any pockets.

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Control Surface Mechanism

1,759,442. Richard Henry Depew, Jr., Forest Hills, N. Y., assignor to Fairchild Airplane Manufacturing Corp., New York, N. Y. Filed April 2, 1928. Serial No. 266,831.

FOLDING WINGS which may be folded without disconnecting the aileron control mechanism are provided for in this patent. This mechanism also automatically folds the ailerons up when the wings are disconnected. By means of ball and socket joints the aileron controls are led directly through the wing at a point very near to the folding hinges. When the wings are folded back, the shortening of the rods automatically raises the ailerons to the proper level. By means of an adjustable cam, which may be manipulated by a lever, the pilot is also able to adjust the angle of the ailerons while in flight.

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Aircraft Dolly

1,754,407. Lloyd Stearman, Wichita, Kans., assignor to the Stearman Aircraft Co., Inc., Wichita, Kans. Filed September 12, 1929. Serial No. 392,064.

A SIMPLE DOLLY which may be quickly attached or taken off from a rotating tail wheel is the object of this invention. The dolly is of rugged construction and is made throughout of welded steel pipe. It has a "U" section which fits around the tail wheel and spring fasteners hold it securely once it is in place. The length of the handle is adjustable. To unhook the dolly it is necessary only to pull a cord fastened to two spring catches, which releases the hold mechanim and allows the dolly to be lifted free of the wheel.

The patent also covers a type of tail wheel upon which this dolly will fit.

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Air Intake Heater

1,757,488. Lloyd Stearman, Wichita, Kan., assignor to the Stearman Aircraft Co., Inc., Wichita, Kans. Filed September 12, 1929. Serial No. 392,063.

A PRE-HEATER for aircraft carburetor intakes is the article covered in this patent. The heater consists essentially of two piping arrangements through which the exhaust gases are led off, and a secondary piping layer, built around a short distance of each of these exhaust pipes. From these the heated air is led into an intake connected with the carburetor. An adjustable air scoop allows this air to be drawn directly from the outside or passed over the heating elements.

It is claimed that this device will automatically guard against fire which might be caused by the engine backfiring and that the device may be readily attached to existing aircraft.

THE BUYER'S LOG BOOK

This Log is prepared by the editors of AVIATION *purely as a service to readers. All items are published free of charge, solely on their news value, and without any advertising consideration whatsoever. Manufacturers are invited to send in material for this section.*

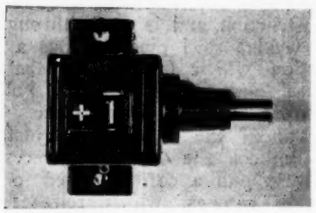
Glider Safety Belt

A SAFETY BELT specially designed for use with primary gliders has just been announced by The Russell Manufacturing Co., Middletown, Conn. The design was worked out in cooperation with the American Motorless Aviation Corp. of New York City to the specifications of Mr. Heinrich Knott.

Features of the belt are the positive lock fastener and the 8 in. wide waist band which gives support and protection to the pilot. Both ends are easily adjustable through a friction type buckle similar to the design used on parachute harnesses. The belt is furnished with or without special elastic connecting links in the form of Rusco Aero Rings.—AVIATION, *June 21, 1930.*

Stabilizer Indicator

A NEW INSTRUMENT for use in aviation called the stabilizer incidence indicator is now in production at the Hartford factory of the Veeder-Root Company. The instrument consists of a small, light weight counter geared to the stabilizer controls, which indicates directly in degrees the angle of incidence at which the stabilizer is set. Positive and negative indicators show the direction from "Neutral" and the degrees are indicated in numbers from 1 to 5.—AVIATION, *June 21, 1930.*



The Veeder incidence indicator

Built In Landing Light

A NEW BUILT IN LANDING LIGHT type LANR 1250 S is now being produced by The Pyle-National Co. of Chicago. The light is built into the leading edge of the wing and consists of a 12 in. silver plated reflector, a pre-focused socket and 12 in. prismatic lens all mounted in aluminum frames. The reflector and lens combination is designed to give maximum beam candle power at all times. The lamp to be used with this type of light is the 12 volt 20 ampere pre-focal base type recently developed by the Pyle-National and Westinghouse engineers. According to the manufacturer, type LANR light projects a beam wide enough to give full pick up of ground detail from altitudes from 500 to 1,000 ft. The beam has a sharp cut off without any stray light and its white appearance aids pentration and increases the visibility of ground detail.—AVIATION, *June 21, 1930.*

Aviation Compressor

MODEL A-C-E air cooled, single stage compressor for use in the aviation field has just been placed on the market by the Gardner-Denver Co. of Quincy, Ill. The unit consists of a 3½ x 4 duplex compressor and a 5 hp. motor mounted on a cast iron base on top of the air receivers. It has a displacement of 26 cu. f.p.m. operating at a rate of 600 r.p.m.

An outstanding feature is the enclosing of the suction and discharge valves in separate compartments. This prevents the air from being heated when passing through the intake valves. An automatic or hand operated start and stop control is furnished as standard equipment and operated in conjunction with the Penn type pressure and moisture unloader. Lubrication is the controlled splash type. Other features of the compressor are the V-type belt drive, fan type of flywheel, use of Hyatt type roller bearings, an aftercooler in the base and a muffler for the suction opening.—AVIATION, *June 21, 1930.*

Blue Diamond Drills

WHITMAN & BARNES, INC. of Detroit recently announced a new type of high speed small drill to be known as the Blue Diamond High Speed Drill. This differs in design from the regular small high speed drill and is given a special heat treatment. The company states that this combination gives the drill extra strength and ability to penetrate faster. The drill is furnished only in jobbers' sizes 1/16 to ¼ in. by 64ths and wire sizes No. 1 to 55 inclusive.—AVIATION, *June 21, 1930.*

Phos-Copper Alloys

THE Westinghouse Electric and Manufacturing Co. has just introduced the Phos-Copper alloys for use as a general welding and brazing material for copper and copper base alloys. Phos-Copper marketed in rod and strip form is composed essentially of copper and from 5 to 10 per cent phosphorus, the fluidity of the material being directly proportional to the phosphorus content. The higher degree of fluidity, the better will be the alloying, penetrating and cementing properties at a comparatively low welding or fusing temperature. Phos-Copper is used extensively in the manufacture of electrical equipment and for making joints in water heaters, radiators and cooling coils. It may serve as a substitute for silver solder.—AVIATION, *June 21, 1930.*

Trade Catalogs

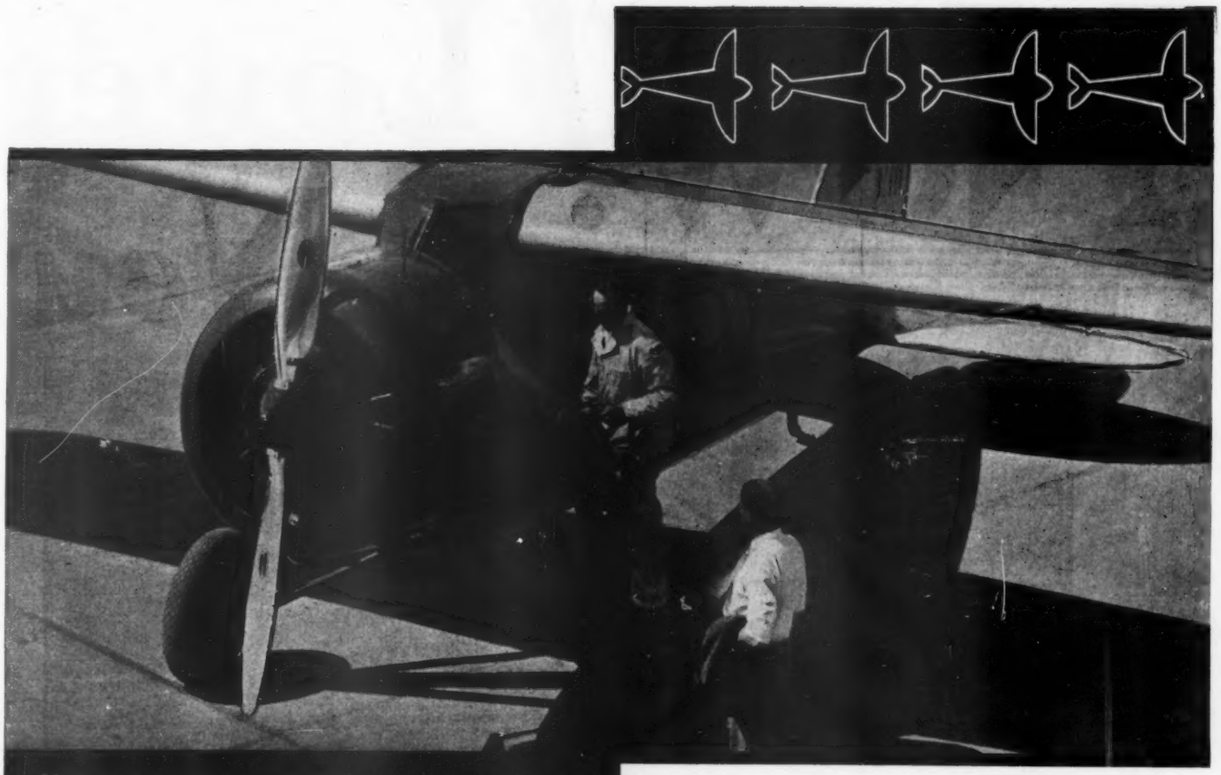
▶ *Fire pots and torches.* The new 12-page Catalog D just published by Clayton & Lambert Mfg. Co. shows the company's line of torches and firepots for kerosene and gasoline. Torches Nos. 308, 32-A, 52 and 51, and firepot No. 75, all recently introduced, are described in the catalog. A supplement devoted to repair parts is obtainable.

▶ *Uses of Nickel Cast Iron.* The International Nickel Co. Inc. recently issued a catalog dealing with outstanding applications of nickel cast iron. The alloy is classified under five important industrial fields for reference by designing engineers or manufacturers of equipment employing cast iron.

New Wappat Bench Grinder

A NEW Red Streak portable electric bench grinder designed for tool sharpening as well as for general grinding purposes is announced by Wappat Inc. The two 6 in. grinding wheels are covered with adjustable safety guards, thus protecting the operator, and making it possible to grind at any position on the circumference of the wheels. The switch is located at the base. The grinder is so balanced as to prevent vibration and is light enough to move from place to place.—AVIATION, *June 21, 1930.*

The Wappat Red Streak



"BOY, OH, BOY! How that Quaker State can take it!"

QUAKER STATE Aero Oil will give flawless lubrication for hours on end. Long after ordinary oil would have been beaten to a frazzle, Quaker State still asks for more of the toughest punishment a motor can give it. And the reason lies in the *extra* quart of lubrication you find in every gallon of Quaker State AeroOil.

Extra quart? What do we mean by that? Just this...

In every gallon of ordinary oil there is a quart of material that is of little or no value in the lubrication of an airplane motor. It's a quart of waste that's left in by ordinary refining.

But Quaker State Aero Oil is not refined in the ordinary way. It is super-refined, carried a step further by an exclusive process that removes the quart of waste. In its place you get a quart of the finest lubricant—four full quarts of lubricant to every gallon of Quaker State Aero Oil. So you really get an *extra* quart.

That's one reason why Quaker State will outlast and out-lubricate ordinary aero oils. Here's another. Every gallon of Quaker State Aero Oil is made from 100% pure Pennsylvania Grade Crude Oil—the finest base an aero oil can possibly have.

Give Quaker State Aero Oil a try. See what happens. Notice how a motor responds to Quaker State's smoother, sweeter lubrication. Notice how Quaker State continues to give trouble-free performance as the hours pile up. Then when you've drained it out, examine it. You'll discover that Quaker State is *still* good lubrication—you'll know that the *extra* quart makes Quaker State the finest aero oil that ever took a plane down a runway.

QUAKER STATE

TRADE MARK REG. U. S. PAT. OFF.

AERO OIL

Get that extra quart in every gallon

Other Pure Pennsylvania Products are:

QUAKER STATE MEDIUM MOTOR OIL

QUAKER STATE MEDIUM HEAVY MOTOR OIL

QUAKER STATE HEAVY MOTOR OIL

QUAKER STATE COLD TEST

QUAKER STATE TRACTOR OILS

QUAKER STATE OIL REFINING CO., OIL CITY, PA.

Now! Lower New

THE FIVE PLACE PASSENGER PLANE $7,990

Approved Type Certificate 224

Increased production on the New Standard Five-Place plane, has brought about this price reduction. It's still the same plane, every item as good as ever, but appreciably lower in cost.

As a money earner, this plane has no equal in its class. It seats four passengers, hops out of small fields, is safe, dependable and extremely well equipped. It has the famous safety fuselage, built of riveted open-section Duralumin.

Standard equipment includes: complete set of Pioneer Instruments, Eclipse Starter, Bendix Brakes, Oildraulic landing gear struts, navigation lights, steerable tail skid and a complete set of covers.

You must see this plane before you choose a new one. Write or wire for a demonstration.

Specifications and Performance

FIVE-PLACE, D-25a

Length Overall	26' 10"
Height	10' 2"
Span, Upper Wing	45'
Lower Wing	32' 6"
Dihedral, Upper Wing	2 Degrees
Lower Wing	4 Degrees
Stagger	34"
Gap	72"
Chord, Upper Wing—70" Average (Tapered)	
Chord, Lower Wing—50" Average (Tapered)	
Wing Area including Aileron	350 Sq. Ft.
Aileron Area	26 Sq. Ft.
Stabilizer and Elevators	43 Sq. Ft.
Fin and Rudder	14.2 Sq. Ft.
Load Per Square Foot	9.72 Pounds
Landing Gear Tread	8 Ft.
High Speed (Full Load)	110 M.P.H.
Cruising Speed (Full Load)	95 M.P.H.
Landing Speed (Full Load)	37 M.P.H.
Climb at Sea Level, (Full Load)	750 Ft. per Min.
Service Ceiling (Full Load)	18,000 Ft.
Cruising Radius (Full Load)	430 Miles
Normal Fuel Consumption at Cruising Speed (Full Load)	12.7 Gal. per Hr.
Weight Empty	2010 Lbs.
Disposable Load	1390 Lbs.
Pay Load	810 Lbs.
Gross Weight	3400 Lbs.
Take Off (Full Load)	8 Seconds
Load per Horsepower	15.4 Lbs.
Powered with a Wright Whirlwind 225 hp. Motor.	

New Standard Airplanes are sold direct to purchasers.

New Standard

Prices On *Standard* Planes

$3,131 THE KINNER POWERED TRAINER

Approved Type Certificate 216

Here again, the economies of increased production have enabled us to reduce prices materially on this plane of proven design and acknowledged performance.

The New Standard Trainer, built to Navy specifications, is the leading trainer of its class. It is rugged enough for outside loops, safe enough for primary work and maneuverable enough for any kind of training.

Equipped with Pioneer instruments and all necessary equipment, ruggedly built with fuselage of riveted open-section Duralumin and wings of government specification spruce, it is the ideal training plane.

See this plane at your earliest opportunity. Write or wire for a demonstration.

Specifications and Performance

TRAINER, D-29a

Span	30 Ft.
Length	24 Ft. 7½ Ins.
Tread of Landing Gear	6 Ft.
Chord of Wings (Upper and Lower)	54"
Wing Area (including Ailerons)	245 Sq. Ft.
Aileron Area	21.5 Sq. Ft.
Stabilizer and Elevators	33 Sq. Ft.
Fin and Rudder	13.5 Sq. Ft.
Load per Square Foot	7.3 Sq. Ft.
Load per Horsepower	17.9 per hp.
Weight empty	1175 lbs.
Disposal load	615 lbs.
Gross weight	1790 lbs.
High speed (Full load)	98 m.p.h.
Cruising speed (1650 r.p.m.)	75 m.p.h
Landing speed	38 m.p.h.
Rate of climb	500 ft. per min.
Service ceiling	11,000 Ft.
Take-off time (Full load)	8 Seconds
Take-off distance (Full load)	245 ft.

▼ ▼ ▼

Duralumin Fuselage.
Pioneer Instruments.
Oildraulic landing gear struts.
Clear vision gasoline gauge of our own design. Perfect for student training.
Kinner 100 hp. motor.

All prices on New Standard Airplanes are net, f. a. f. Pine Brook Airport, N. J.

Aircraft Corp.

Paterson, N. J.

"LIGHT" ON AIRPORTS

An airport project, scrutinized in the "light" of a painstaking survey which considers all possible factors, is a project well begun.

The value of this preliminary survey cannot be over-estimated. Important questions must be answered. Is the site well chosen? How large need the airport be to meet present requirements? To care for future growth? What income can be reasonably anticipated?

To answer these and numerous other questions intelligently requires wide experience in airport planning and building. We have it—and are adding to it every working day in the execution of contracts for cities throughout the country. Airport building is a new science—be sure you're right before going ahead.

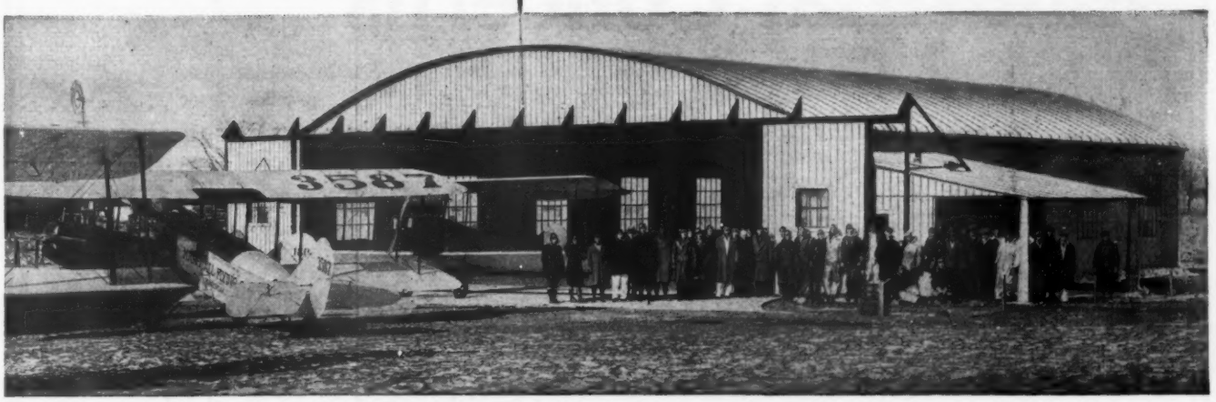
AIRPORT DEVELOPMENT & CONSTRUCTION CO.

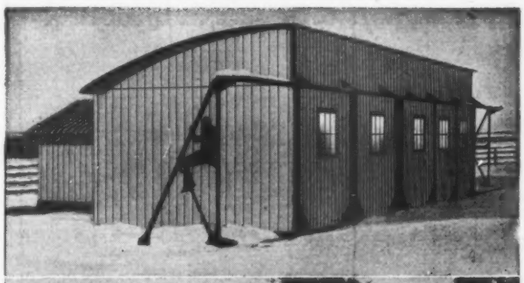
MITTEN BUILDING PHILADELPHIA, PA.

CONSULTANTS
ENGINEERS
BUILDERS

Send today for our booklet "Before Starting Your Aviation Development." No obligation.

BUTLER READY-MADE HANGARS FOR INTERMEDIATE AIRPORTS





Made entirely of STEEL

Along the air travel routes of the nation the growing demand for intermediate airport facilities are being met with Butler Ready-made Steel Hangars.

Completeness, Speed and ease of erection, fire-safeness, permanence, and attractiveness are economic features which have made them first choice for all airport sheltering purposes.

Sizes range from the large airport types with clear spans of 80 feet or more down to the individual T-shaped, round or gable roof hangars for any size airplane. Air stations along transport lines, flying schools, hangars and training quarters, plant buildings for aircraft factories, ground equipment and material warehouses and repair shops are some of the many other air industry purposes served by Butler Ready-made Steel Buildings. Butler designs include combinations of steel and stucco and steel and brick veneer.

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of a notable contribution
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THE CERTIFICATE OF MERIT
TO
Heyman Rosenberg
For his Hardened Metallic Drive Screws

The Franklin Institute

awarded

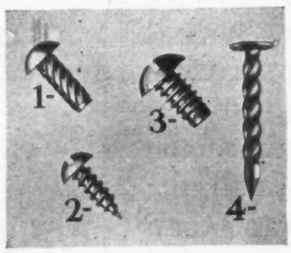
The Certificate of Merit

to the Inventor

of Self-tapping Screws

The award of The Franklin Institute's coveted Certificate of Merit to Mr. Heyman Rosenberg is only fitting recognition of his contribution to the mechanic arts. His Self-tapping Screws have greatly aided American industry, particularly in the development of mass production.

Enormous economies of assembly time and labor have been made possible by these unique Screws which are so hardened and threaded that they tap their own thread in metal as they are driven. Slow and expensive tapping, for 1500 years necessary to the assembly of metal products with screws, is no longer required for hundreds of assemblies.



TYPES OF SCREWS

1. *Hardened Metallic Drive Screws*... are simply hammered into drilled or formed holes. Used for making permanent fastenings to iron, brass and aluminum castings, steel, Bakelite, etc.

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PARKER-KALON
HARDENED
Self-tapping Screws
PAT. IN U.S. AND FOREIGN COUNTRIES

What do you need?

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BEACON AND
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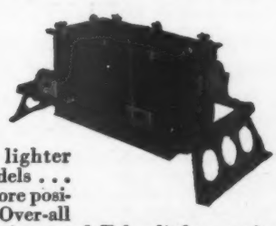

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Model 1286

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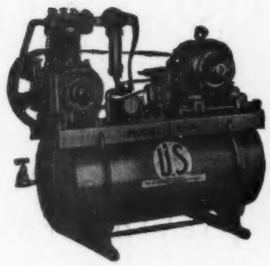
Inquiries should be addressed to nearest office



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Business Wants

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Agencies Wanted
Agents Wanted
Books and Periodicals
Business Opportunities
Civil Service Opportunities
Contracts Wanted
Desk Room for Rent or Wanted
Educational
Employment Agencies
Employment Service
Foreign Business
For Exchange
For Rent
For Sale
Franchises
Labor Bureaus
Miscellaneous Wants
New Industries Wanted
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Partners Wanted
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There's more

Safety

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AIRCRAFT TIE ROD

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Hartshorn Square Section Tie Rods **absolutely prevent torsional strain in internal wing and fuselage bracing. If it's there, you see it and take it out. The flat faces save assembly time, for wrenches can be applied at any point along the rod and tight corners are no longer troublesome.**

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It is the age of color even for the plane and in keeping with this modern desire, Zapon Cloth for interior upholstery lends an ultra luxurious finish to the finest sport job. Brilliant in color, attractive in pattern, its durability is such as to "wear and wear and wear."

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B-804

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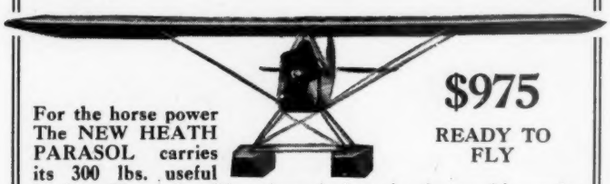

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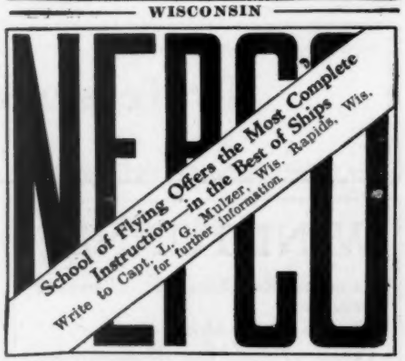
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Av-06

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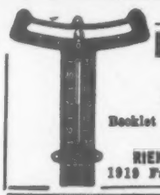

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We can recondition your old Mica plugs to give the same service as new ones. Will stand 100 lbs. pressure test. 25c. each. Lots of 100 or more 15c. each. Reconditioned B.G.IXA Sparkplugs 75c. each.
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Discount **of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).**

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An advertising inch **is measured vertically on one column, 3 columns—30 inches—to a page.**

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ALLISON Mono, Jenny has 110 hp. Anzani, Wings are new, fuselage in perfect condition. Less propeller. J. Thomas, 111 Burke Ave., Linoleumville, S. I., N. Y.

BARGAIN, OX-5, complete, with stacks and hub, 20 hours since factory rebuilt, turns 1,400 and better on ground, $175. Ray Kelly, Marietta, Okla.

CURTISS motors. For immediate disposal a limited number of new OXX-6 and government rebuilt OX-5 and OXX-6 motors away below market prices. All motors in original government boxes and have not been used since purchased directly from the government. Also new spare parts. Get our quotations. Aero Motor Sales Co., 500 East Jefferson, Detroit, Mich.

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EAGLEROCK long wing OX-5 unlicensed, completelyy overhauled, less than ten hours. Possible trade on radial licensed plane. Write Lester Dithloff, 13604 Garden Road, Cleveland, Ohio.

FLEET J-6, 165 hp., in best of condition, equipped with standard steel propeller, parachute type seats, dual controls, baggags compartment, bank and turn indicator, compass and air speed. W. P. Phipps, 30 Charlton Street, New York City.

FOR SALE: OX-5, OXX-6 and Hisso engines. Write for complete description. Heckman Machine Works, 4026 Lake Street, Chicago, Illinois.

FOR SALE: 95 hp. English Mark 111 Cirrus engine. Splendid shape, just overhauled. Has had approximately 120 hours. Best offer takes it. Menasco Motors Inc., 6718 McKinley Ave., Los Angeles, Calif.

FOR SALE: One airplane with 60 hp. LeBlond motor. Very low price for quick sale. Golden Eagle Aircraft, Inc., Port Columbus, Columbus, Ohio.

FOR SALE

FOR SALE: Aristocrat high-wing cabin monoplane with Wright J-6 engine, licensed, like new. Ship and motor both 40 hours, always kept in hangar. Wing tanks, compass, air speed, oversized tires, air starter, steel propeller, cruising speed 96 miles per hour. Reason for selling am buying a larger and faster ship. Price $5,500, 10 per cent discount for all cash. List price new was $8,000, including extra equipment; only 6 months old. Florida Aircraft Corporation, Dunedin, Fla.

FOR SALE: Airplanes, OX-5 Travelair, just overhauled, excellent condition and licensed. For quick sale, $1,200 cash. Telephone George Daws, Sherwood 2-3870 or write 230 East 16th Street, Paterson, N. J.
AVIATION WANT ADS—5¢ PT.

FOR SALE: New 220 Hisso. Many spares, tools and two propellers for same. OX-5 Canuck, excellent flying condition, three spare wings, etc. Almost new 28 ft. Russell seat pack silk parachute. Prices very low. Pay cash for Wartime pursuit ship such as SE-5, Spad, Camel, etc. or VE-7 or make trade. New York Central Airlines, Kingwood Park, Poughkeepsie, N. Y.

FOR SALE: Long wing OX-5 Eaglerock. Motor completely overhauled 40 hours ago. Can guarantee motor and plane in excellent condition. Metal fuselage $950, flyaway Sioux City. Baxter Flying Service, Inc., Sioux City, Iowa.

FOR SALE: Irwin Meteorplane, Model MT2, less motor, motor mount for Henderson motor. Plane needs slight repairing on tail assembly. Always kept inside. Plane has tachometer, altimeter oil pressure, oil fahrenheit, switch and air-speed indicator. First $250 buys all. F.o.b., L. T. Peck, 8 Olive Place, Hornell, N. Y.

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RANGE : 5000 MILES IN 42 HOURS

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Hamilton-Standard Metal Propeller.

Fuselage tanks equipped with eight-inch-diameter, quick-opening and closing dump valves, operated from the cockpit, the closing feature permitting the tanks to be used to float the airplane in water.

All gasoline lines and connections taped and specially secured, with double gasoline line from strainer to engine.

Fuel feed direct to carburetor from fuselage tanks or pumped through wing tanks for gravity feed to engine or vice versa, using engine pump or hand pump interchangeably.

Navigation lights, and complete internal lighting where necessary, with 18 amp. hr. storage battery.

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FOR SALE

FOR SALE: 1 Wright J-5 motor and 1 propeller. Only 20 hours since complete overhaul. Willing to dispose at a reasonable figure. Write or wire. Geo. A. Wies, Inc., Roosevelt Field, Garden City, N. Y.

FOR SALE or trade: Martin Biplane with Wright E-4 engine, A-1 condition. Damaged Curtiss Challenger. Veli M-5, less magnetos, nearly new. One Hisso H with propeller. Complete set of wings for Waco Ten. P. O. Box 1024, Tampa, Florida.

FOR SALE: Lincoln Sport, less motor, $100. Want new Le Rhone 80 or 120. Harry Fleming, Somers Point, N. J.

FOR SALE: Licensed OX-5 Challenger, recently overhauled and repainted. Now in use at Berwick, Pa., Airport. Price $1,700. Address Peter Zlobik, 40 W. Main St., Plymouth, Pa.

FOR SALE: New Curtiss Gypsy Moth, safety slotted wings. Has been used for display purposes only. Pierpont Motor Co., 5001 Baum Blvd., Pittsburgh, Pa.

FOR SALE: Travel Air biplane, ex-mail job. Completely overhauled. New license NC 2709. New J-5 motor, Hamilton steel propeller, brakes and full set of instruments. Price $3,750. Jesse S. Anderson, 566 Maple Avenue, Newark, Ohio.

FOR SALE: Henderson biplane, 100 ft. takeoff. $325. Or Henderson complete with stacks, propeller, hub, tach., cooling plugs. $175. R. M. Schuetze, Box 208, Waukesha, Wis.

FOR SALE: Mercury C-6-A 3-place biplane "NC" license; 800 lbs. pay load, metal prop., brakes, wonderful condition, 5 hours since last complete overhaul. Bargain $1,400 cash. M. F. McHenry, Hornell, N. Y.

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LOENING air yacht, 8-place, 525 hp., Wright Cyclone engine, electric starter, licensed, equal to new. Cost $30,000 year ago. No reasonable offer refused. Lincoln-Page, OX-5 motor, 50 hours flying time, will sacrifice for quick cash sale. Pitcairn-Orowing, OXX-6 motor, 2 scintilla magnetos, motor just overhauled, good condition. Sacrifice for quick cash sale. Fairchild F-C-2, 5-place, licensed, in exceptionally good condition, 300 hp. Wright 5-6 motor, worth $15,000, August 1929. Will sell for $8,500. Westchester Airport Corporation, Armonk, New York.

MODERN all-metal flying boat with completely rebuilt M. F. wings and tail surfaces, licensed Dept. of Commerce, N. C., 124, power good, 180 Hispano, salt cooled valves, Delco ignition, new 12 volt battery, Bijour electric starter, dash primer, etc. Hull copied from Curtiss Sea Gull with more beam, higher bow, but all dural in both hull and sidewalks. Curtiss Reed metal prop. Very sturdy job, does not leak a drop. Larger spars were used in new sea gull wings. Wings inspected Dept. of Commerce before covering. Never cracked up and in perfect condition. 75 gal. aluminum gas tank, two strainers on line, all instruments. Cigar lighter on dash, night flying lights, seats four. Dual control with special wheels, one set easily disconnected, anchors, lines, etc. Wonderful ship in a sea. Assembled, thoroughly tested and ready to fly away now. Must sacrifice immediately, $2,750. Write or wire for pictures. Paul Strasburg, Jefferson at Newport, Detroit, Michigan.

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ONE flying boat with two Hisso motors, one extra set of wings, eight extra banks for $1,000. New Orleans Air Line, New Orleans, La.

ONE Lincoln Sport plane, less motor, propeller and axle. Plane is in good shape. Price $200. Will not crate. Laurence Raynolds, Allen and Norwood Aves., Allenhurst, New Jersey.

FOR SALE

ONE OX-5 motor; never been flown since major overhauling; equipped with special pistons; extra crank shaft; lower and upper crank case; other miscellaneous parts. All for $375. Auto Electric & Radio Equip. Co., Harrison at Baker St., Fort Wayne, Indiana.

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Bellanca CH	7 Place	Wright J-5	172	New Castle, Del.	6600.00
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will close two days in advance of the regular schedule.

Advertisers will be cooperating with us by sending new advertisements or changes of copy early.

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10 A.M. Friday, June 27, 1930

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RYAN B-1 monoplane with Wright J-5 motor. Just overhauled. Complete night flying equipment, and special instruments. Must sell this and nine other planes immediately. A wonderful ship for transport use at $4,000. No trades nor turns. Beacon Airways of America, Inc., Richards Field, Kansas City, Missouri.

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SELL or trade for car, 3-place Swallow, 125 hp. air-cooled Super Rhone engine. Bargain $1,250 or $850 less motor. Box 921, Wichita, Kan.

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WANT complete large tail surfaces for Ryan B-1. C. E. Schneider, 5032 Hurlbut, Detroit, Michigan.

WANTED: Heath-Henderson motor. Prefer one with propeller and tachometer. Must be late model and in A-1 shape. Leo Allinger, Summit Beach Park, Akron, Ohio.

WANT parachute 24 or 28 foot, in good shape. State price, make and when bought new. Tonnele Co., 159 Tonnele Ave., Jersey City, N. J.

WANTED two ships in good condition. Cash for one and late model car and terms on other. Give prices F. A. F., Minneapolis. Must be bargains. EW-576, Aviation, 520 No. Michigan Ave., Chicago, Ill.

TRADE

WILL trade OX-5 combination Eaglerock and 1928 Marmon 8-cylinder, 4 door sedan, for good Monocoupe. H. Hazelbaker, 2810 Sherman Rd., Portsmouth, O.

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WANTED: Transport pilot, experienced dual instructor. Give full details in first letter. Howard G. Mayes, Operations Manager, West Virginia Airways, Dunbar, W. Va.

WANTED: Capable, sober, man for repair service. State age, experience, training, previous occupations. Steady work. P-575, Aviation, 520 No. Michigan Ave., Chicago, Ill.

POSITIONS WANTED

ACCOUNTANT - AUDITOR desires connection with manufacturer, operator or large school. Can take complete charge of all office activities. At present time connected with a flying service. PW-574, Aviation, Tenth Ave. at 36th St., New York.

AERONAUTICAL engineer, February graduate U. of M., age 30, wants position of any kind with an aircraft concern. Experienced in wind tunnel work. PW-573, Aviation, 520 No. Michigan Ave., Chicago, Ill.

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COMMERCIAL pilot, experienced on open and closed ships; go anywhere; furnish best of references; just want opportunity to build time. Jos. D. Bassler, 1027 Clarence Ave., New York

LICENSED airplane and engine mechanic desires position with reliable firm in the East. Eight years' army and air mail experience. PW-572, Aviation, 520 No. Michigan Ave., Chicago, Ill.

LIMITED commercial pilot, graduate of Von Hoffmann Aircraft School, desires position with reliable concern or individual. Best references. Lyman Stambaugh, Spring Grove, Pa.

TRANSPORT pilot, 400 hours, all types, employed at present as instructor and ferry pilot, desire change. Will go anywhere. Ira Hurst, 1836 South 26th St., Lincoln, Nebraska.

TRANSPORT pilot, experience all types, desires position flying. Available at once. Will go anywhere. Joe Hunter, Box 996, International Falls, Minnesota.

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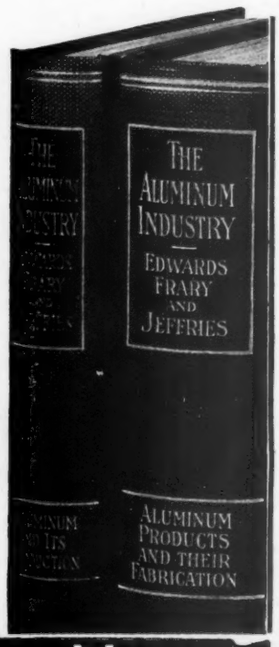

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WHERE TO FLY

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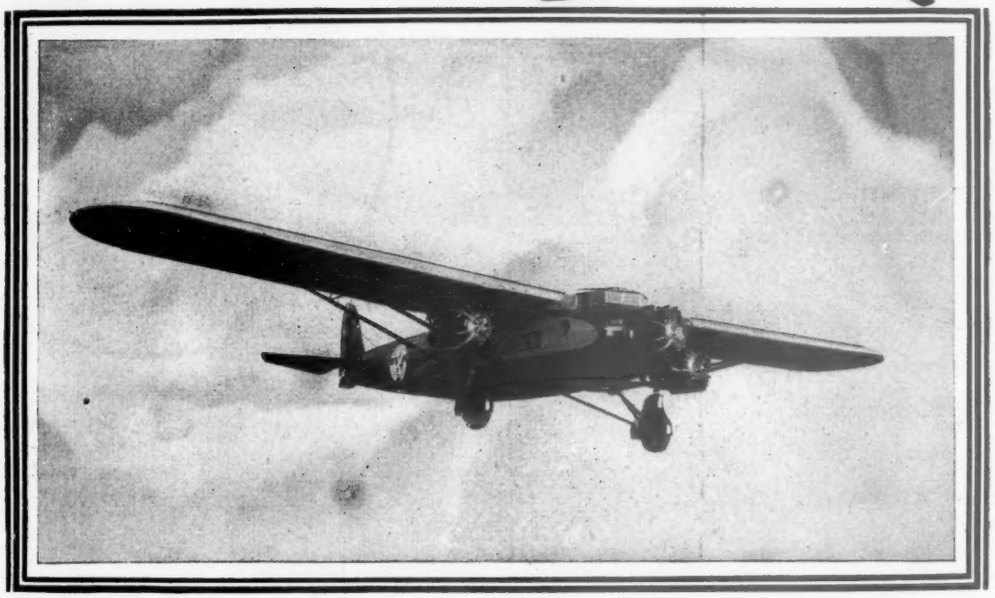

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DIVING BOMBERS

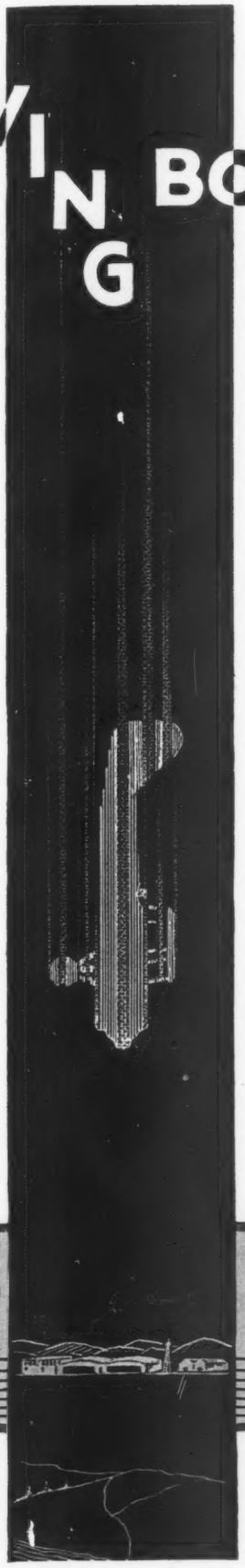
A NEW ERA IN AERIAL TACTICS!

Down—down—down—for 6,000 feet in a vertical dive, carrying a 1,000-pound bomb in a standard naval bomb release! Attaining full terminal velocity of more than 4 miles per minute. Then pulling out sharply from the dive with the bomb still in place! Again and again, this feat was performed by the new Martin Diving Bomber XT5M-1—a feat never before accomplished by any plane in any country.

Still carrying the 1,000-pound bomb, this rugged bomber executed pursuit aerobatics such as loops, rolls, Immelmans and inverted flying with astonishing ease and grace. It has set new records for bombing plane performance and established new tactics for aerial warfare.

What is responsible for the remarkable stamina and maneuverability of the new Martin Diving Bomber? First, the able aerodynamical design of the plane by the Bureau of Aeronautics of the United States Navy. Secondly, the typical Martin dependability in developing the structural and detail design—made possible by exhaustive research, vast resources and the "knowing how" that comes from twenty-one years of airplane-building experience.

Dependability is the one factor indispensable in building any type of aircraft, whether it is battle planes or planes for pleasure and business. The U. S. Government, which leads the world in aircraft research, gets from Martin construction the ultimate in dependability!



MARTIN AIRCRAFT

THE GLENN L. MARTIN COMPANY

Builders of Dependable Aircraft Since 1909

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COMFORT, COST, CONFIDENCE SET NEW TRAFFIC MARK!

THREE million men, women, and children took to the air last year. Between July and December traffic sped over America for 78,940,161 swift, straight miles. Planes today are carrying more first-flighters and developing more seasoned air travelers than ever before.

Some weeks ago, the American Society for Promotion of Aviation offered first flights at $1 a ride. With little advertising, 5,182 mothers, fathers, and youngsters showed that they're not only unafraid to fly, but are anxious to go up behind Wright "Whirlwinds" and "Cyclones." Comfortable weather helped get them up, and price also played a part.

But the thing which counted most of all is the public's growing confidence. Sturdy planes, powered by Wright and piloted by capable men, daily carry new crowds aloft. Comfort, cost, and confidence are setting new traffic records:

To the masses "Powered by Wright" means confidence in Flying. Dependable performance of Wright's five world-proved engines makes the phrase an asset not only to Wright . . . and to Aviation . . . but to each of the 4,000,000 who've already flown, and to countless others who'll soon be taking their first trips up!

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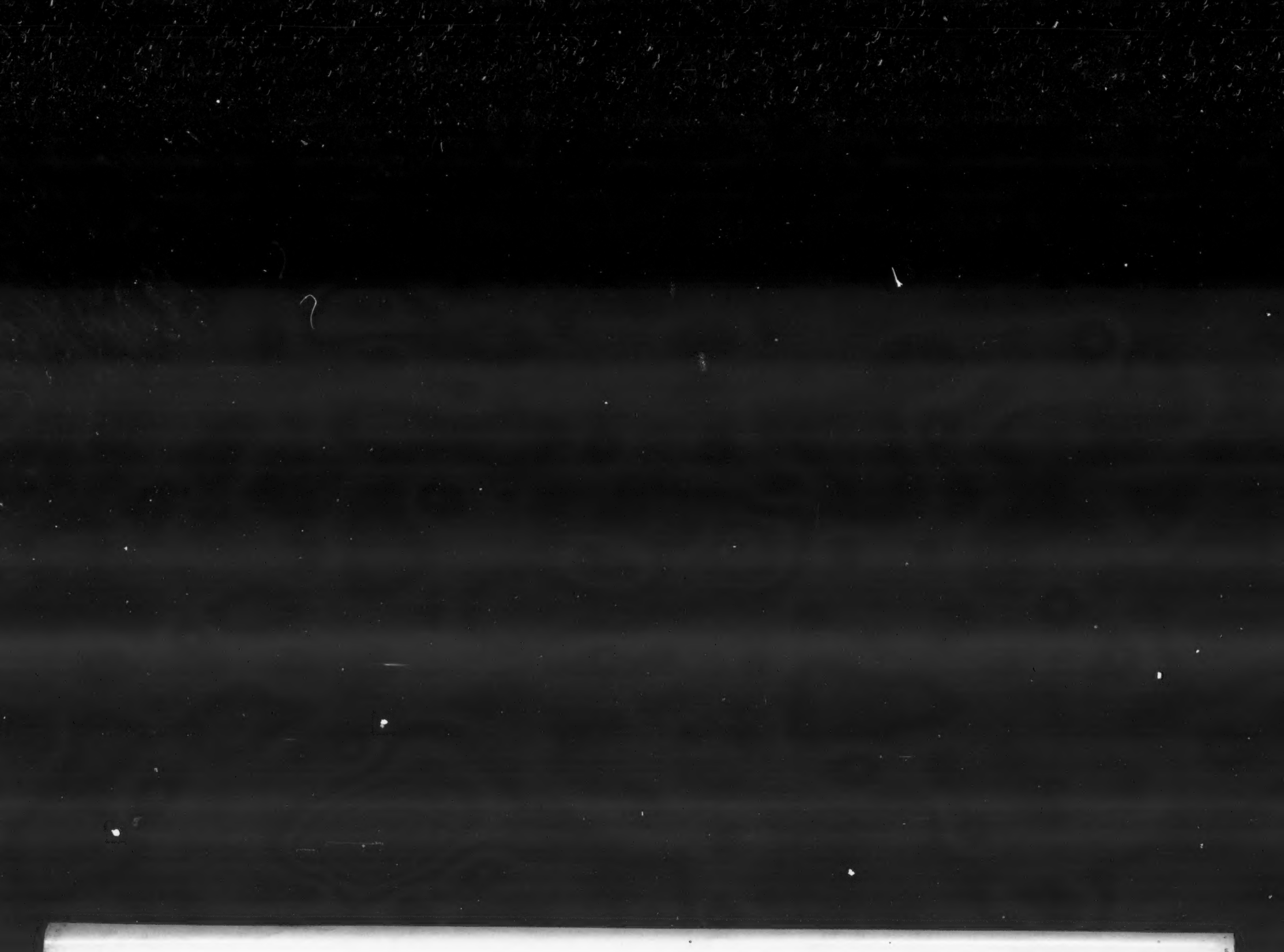
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